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The Effects of Co-Teaching on Regular Education and Special Education Students' Standardized Communication Arts Test Scores in a Suburban Midwest Middle School

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ABSTRACT

In response to numerous mandates in the field of education, schools have found it imperative to ensure that teachers are incorporating effective instructional methods which meet the diverse needs of student populations within a single classroom. The co-teaching model of instruction is just one way educators have chosen to lead classroom instruction in order to reach all learners. In the co-teaching setting two or more teachers work together to deliver instruction to a heterogeneous group of students in a class. This research study was completed to determine if the co-teaching method featuring two content area teachers had a positive effect on student achievement as measured by a valid and reliable standardized achievement assessment. This study presented the history and overview of the co-teaching strategy and highlighted the implementation of this model in schools. First, the study used teacher evaluation data and administrator confirmation that the method was being used with fidelity. Then, the researcher analyzed archival data on 784 student scores on a yearly standardized assessment and broke down the data into subgroups. Finally, the researcher performed a limited mixed effects model (LMM) test to measure if student scores were higher in a co-taught with two content area teachers classroom setting when compared to students' scores in a traditional setting. Although the students in the co-taught classroom setting achieved higher scores on the yearly assessments, the differences were not at a statistically significant level. Further study on implementing the co-teaching model with two content area teachers is needed. This instructional strategy should be studied in alternative settings, additional grade levels, and other content areas to determine if this method is beneficial for all students. Also, additional longitudinal observation of this cohort might be useful to see if the co-taught classrooms resulted in longer term effects on learning.

Dedication

To my parents, Bruce and Toni, and all the rest of my wonderful family, thank you all for your love, support, and encouragement throughout my life. You all taught me to dream big, work hard, and value education. I finally made it!

To the love of my life, Quintin, you have been a blessing to me; thank you for loving me through it, supporting me emotionally and financially, encouraging me every day, keeping me grounded and reminding me of what is important in life. You have helped me to achieve my dream, always lifted me up, and never held me back. Your belief in my abilities has helped me to be successful and your pride in my accomplishments has made this whole process worthwhile. Thank you.

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The Problem Statement and Its Development

Introduction

This study examined two co-teaching models (co-teaching with two general educators and co-teaching with a general educator and special educator) versus a traditional classroom model to test their impact on increases in student achievement scores as measured by the Missouri Assessment Program (MAP) for the Communications Arts section for students in sixth and seventh grades. For this study, co-teaching is defined as *"*A direct classroom instructional model utilized by one or more regular classroom teachers and possibly a special education teacher. In a general educational setting, this model can also be facilitated by two teachers with the same curriculum or by developing a cross-curricular thematic instructional unit" (Cook & Friend, p. 3). In this study, both classroom environments, two regular education teachers teaching together in one room and one or more regular education teachers teaching with a special educator in the same room are classified as co-teaching. "MAP stands for "Missouri Assessment Program." It is a series of assessments for Communication Arts, Mathematics and Science at grades 3-8; and Communication Arts, Mathematics, Science and Social Studies in high school. These assessments are designed to see if students in Missouri are meeting the Show-Me Standards. The Grade-Level assessments are made up of multiple-choice, machine-scored items, as well as "constructed response" items. These items require students to supply (rather than select) an appropriate response. In addition, the Grade-Level

assessments include some items from Terra Nova, a nationally normed test developed by CTB/McGraw-Hill, so that Missouri student achievement can be compared to groups of students who take the same test in other states." ("Missouri Assessment Program," 2011)

The rationale behind this case study was to measure the effectiveness of co-teaching as an instructional model in a suburban Midwest middle school for both regular education and special education students' scores on the MAP Communication Arts (CA) assessment. This researcher believes that the results gleaned through this inquiry may encourage other public schools to follow this instructional model. The researcher utilized a quantitative approach when examining the MAP CA assessment scores data from the school years of 2010-2012 for both regular education and special education students in grades 6-7. (However, the 5th grade scores (2009) for these students were obtained for use as the pre-test, or baseline, in order to show the increase to the 6th grade scores.)

Background and Context

Co-teaching is a model of instruction that became popular in the United States in the late 1950's through the influence of educator J.L. Trump. Trump did extensive research on the co-teaching model and proposed a reorganization of secondary schools so that teams of teachers would share the responsibility of educating students. Trump felt that the era of the one-room instructor would soon be ending, and felt that

the co-teaching model would be the ideal progression for instruction in the American classrooms. (Shields, 1998)

Co-teaching gained popularity as an alternative educational practice for special education purposes; however, it was not until the late 1980's in the United States that the co-teaching model was reinvented to mainstream students with disabilities into regular education classrooms (Friend, Cook, Hurley-Chamberlin & Shamberger, 2010). This model of instruction gave students with disabilities the opportunity to be taught at the same instructional levels as their peers in the regular education setting. In response to the passing of legislation, such as Individuals with Disabilities Act of 1997 *(IDEA)* which "requires that disabled students, to the extent possible, be taught with nondisabled students in the regular classroom."(Nichols, Dowdy, Nichols, 2010), and No Child Left Behind *(NCLB)*-"Enacted as the Elementary and Secondary Education Act by the United States Congress in 2002, was a mandated federal program developed to drive the improvement of schools by increasing the criterion of accountability to states, offering parents a choice in schools that their children may attend, and measuring student achievement through assessment focusing on mathematics, reading and science."("No Child Left Behind Overview," 2011), many educational institutions have mainstreamed special needs students into regular education classes making it imperative for teachers to find ways to reach all students in their classroom at one time.

Co-teaching has become the norm for the inclusive classroom, joining the content area teacher with a special educator to ensure that all students can be successful with the skills and knowledge required for the class. The co-teaching

model has gained desirability and respect among educators, and educators are now extending its application outside of the inclusive classroom. The co-teaching classroom with two general or content area teachers has increased in popularity because of the implementation of yet another policy, professional learning communities (PLC's). (Chilcoat, 2011) DuFour and Eaker (1998) state, "PLC's are seen as a mutual learning opportunity for educators, it is used to arrange teachers in working groups to devise and collaborate on lessons, curriculum and instruction in a particular subject discipline." (p. 63). Chilcoat shows insight to teachers' response to co-teaching (two content area teachers) as beneficial to students and educators. He states that when two teachers work together to design, implement, and differentiate lessons for students, they feel that students learn better and they become better educators through their support of one another.(Chilcoat, 2011) Tomlinson (2001) defines differentiation as, "Differentiation is an instructional strategy providing students with various approaches to acquire learning content in classrooms that possess students with mixed learning abilities. These approaches include developing materials and lessons for students to choose and delivering instruction so all students can comprehend and excel with the subject matter" (p. 97). Friend, Reising, and Cook (1993) elaborate on this sentiment with these words, "When the two teachers truly perceive that they are equal partners in co-teaching, they report it as a tremendously energizing experience" (p. 8).

Problem Statement

After compiling numerous peer-reviewed journal articles, books, dissertations, and internet resources, this researcher has come to the conclusion that the findings of the impact of co-teaching are varied and contradictory. "The case study in co-teaching in the content areas" by Mastropieri, et. al. 2005 found that the emphasis of high stakes testing had a negative effect on the co-teaching experience. The authors' research discussed the effect of the high stakes testing upon teacher satisfaction in the classroom (teacher satisfaction was reduced because teachers felt constraint and pressure due to the importance placed on the assessments) and did not cover any data on the impact of the co-teaching on the students' achievement on the high stakes test. Tobin (2005) states that, "Although the impact of co-teaching on student outcomes is still unclear (Magiera & Zigmond, 2005; Murawski & Swanson, 2001; Weiss, 2004), proponents argue that co-teaching effectively utilizes the specific and unique skills of each professional (Jitendra, Edwards, Choutka, & Treadway, 2002)" (p. 791).

Tobin's 2005 study of co-teaching in the language arts, utilizing a regular education teacher and special education teacher, had the following findings:

> More investigation with more co-teachers over a longer duration is required…scholars in this area recommend that teachers engage students in interactive scaffolding dialogues…it requires differentiated materials, processes, and content that are more likely to occur with two professionals in a classroom.

This brings out a key point: nearly all research on the topic of co-teaching and its impacts focus solely on co-teaching between a regular educator and special

educator. It is important to note that most research on team teaching or co-teaching has been found in the exceptional student education literature. (Piechura-Couture, et. al., 2006) Murawski and Swanson (2001) reported, using verifiable quantitative data, that significant gains were found in reading, math (for students with learning disabilities), and minimum competency tests. This research built on the previous study by Chalfant and Pysh (1989) which found that student performance (as measured by classroom grade earned, not standardized assessment) and behavior is enhanced, and behavior problems reduced.

Weiss and Brigham (2000) state that co-teaching is becoming an accepted form of collaboration, and teachers using the model should be encouraged to gather ongoing quantitative and qualitative data on the model's strengths and weaknesses. A few studies have begun to investigate co-teaching arrangements on student outcomes using quantitative measures. Investigations of co-teaching on academic outcomes on the elementary level have yielded mixed results (Banerji & Dailey, 1995; Saint-Laurent, et. al., 1998; Welch, 2000). Saint- Laurent et. al. (1998) reported significant improvement in reading and math for the students with and without disabilities, but not the students with learning disabilities in the at-risk group. These authors concluded that the empirical debate on in-class models of co-teaching should continue.

Using a co-teaching model in two different elementary schools, Welch (2000) collected pretest and posttest data on student academic achievement. Paired t-tests showed significant improvement in reading skills of the students without disabilities; although there was also improvement of scores for students with disabilities it was

not at a statistically significant level. Banerji and Dailey (1995) also looked at the gains in achievement of elementary students with and without disabilities receiving instruction in co-taught classrooms. Although the gains of the students with learning disabilities were not statistically significant, the gains of the students with normal achievement were. This was on a reading test comparing pre-test scores and post-test scores of students receiving co-taught instruction from a regular educator and special educator.

Boudah, Schumaker, and Deshler (1997) concluded that co-teaching does seem to have an effect on student outcomes but not necessarily in the desired directions in all instances. This empirical study took place in the secondary setting and showed that the test scores of the students with low average achievement improved slightly, and the scores of the students with disabilities decreased slightly. Rea, McLaughlin, and Walter-Thomas (2002) looked at the effects of co-teaching in the middle school setting. They found that the eighth grade students with disabilities earned higher report card grades, lower disciplinary referrals, and had higher attendance rates than those with disabilities in a resource room and not in an inclusive classroom setting. Fontana (2005) states, "Researchers are calling for more investigations into various aspects of collaborative teachings as a service delivery form and its effects on student achievement as compared to other service delivery models" (p. 19). Kohler-Evans had the following research findings listed in her article:

> Research findings have yielded mixed results on the effects of co-teaching. Some studies have indicated

> that students with disabilities showed larger gains in math and equal gains in reading when compared to students receiving pull out services (Bear & Proctor, 1990), and that consultation plus co-teaching was as effective as other service delivery models (Schulte, Osborne, & McKinney, 1990; Marston, 1996) (p.262).

She further states that:

> Boudah and colleagues (1997) found that performance of students with high-incidence disabilities worsened during co-teaching. Other studies have indicated that for high-risk students with learning disabilities (Dieker, 1998) and students with disabilities (Rice & Zigmond, 1999; Welch, 2000), co-teaching is an effective practice. Even with these mixed results, 77% of middle schools are using some form of co-teaching (p. 263).

Once again, these research studies are looking specifically at special education students and are not looking at standardized achievement scores. This researcher has extended these studies by examining the effects when the co-teaching is done by two content area teachers and/or two content area teachers paired with a special education teacher. The researcher examined the student scores on the standardized MAP CA assessment of regular education and special education students. The researcher determined whether students' scores in the co-taught settings (both two content area teachers and two content area teachers paired with a special education teacher) versus the traditional model setting increase students' scores at a statistically significant level.

The researcher did extensive research utilizing the Boolean search, Eric, ProQuest, and EbscoHost and was unable to find even one study focusing on co-teaching and impacts on standardized assessment. The search terms used were co-teaching, team teaching, differentiation, collaborative teaching, high stakes assessments, student achievement, academic achievement, impacts of, effects of, standardized test, standardized assessments, and student outcomes. The researcher had assistance from the librarian in searching for any peer-reviewed articles which included the aforementioned search terms and was unable to find any articles or books dealing specifically with a study which would examine the effects of co-teaching for regular education and special education students by two content area teachers using the team teaching or co-teaching for differentiation method, and the effects of this instructional method on their standardized assessment scores.

Statement of Purpose

Teachers' jobs are filled with many time-consuming mundane tasks which can take away from instructional time in a classroom. Co-teaching is one way to help get back some of the instructional time without forgoing the necessary tasks that must be done to keep the classroom running smoothly. The jobs of educators do not end at the classroom door either. By contract, teachers are required to attend Individual Education Plan (IEP) meetings, professional development (PD), professional learning community (PLC) responsibilities, and many other tasks as well which take time and energy away from the students. However, with two teachers in a classroom, some of

these responsibilities can be handled during the day while the other teacher is instructing. Two teachers also make it easier to meet the academic needs of all the students in the classroom and better prepare them for the high stakes communication arts assessment which happens each year. Therefore, this study determined if a co-teaching model of instruction made a significant difference in the achievement of regular education and special education students' scores on the standardized MAP CA assessment in Middle School (grades 6-7) compared to the students' scores on the assessment when their instruction for that year was a traditional model.

Research Questions & Hypotheses

Research Question:

1. Does the co-teaching model(s) of instruction make a significant difference in the achievement of regular education and special education students' scores on the standardized MAP CA assessment in Middle School (grades 6-7) compared to the traditional model?
2. Does the co-teaching model(s) of instruction make a significant difference in the achievement of free/reduced lunch students' scores on the standardized MAP CA assessment in Middle School (grades 6-7) compared to the traditional model?
3. Does the co-teaching model(s) of instruction make a significant difference in the achievement of minority (non-Caucasian) students' scores on the

standardized MAP CA assessment in a Midwestern Middle School (grades 6-7) compared to the traditional model?

In order to obtain quantitative data relative to the statement of the problem and the research question, the following hypotheses were developed:

1. After three years at Missouri Middle School A, regular and special education students' mean scores on the standardized MAP CA assessment will increase at a greater rate at the statistically significant level (.05) during their co-taught classes (two content area teachers and two content area teachers with a special educator) when compared to score increases in the traditional classroom at Missouri Middle School B.
2. After three years at Missouri Middle School A, free/reduced lunch students' mean scores on the standardized MAP CA assessment will increase at a greater rate at the statistically significant level (.05) during their co-taught classes (two content area teachers and two content area teachers with a special educator) when compared to score increases in the traditional classroom at Missouri Middle School B.
3. After three years at Missouri Middle School A, minority (non-Caucasian) students' mean scores on the standardized MAP CA assessment will increase at a greater rate at the statistically significant level (.05) during their co-taught classes (two content area teachers and two content area teachers with a special educator) when compared to score increases in the traditional classroom at Missouri Middle School B.

Limitations and Delimitations

This study was limited to students attending Middle School A and Middle School B in a Midwestern suburban school district. The researcher completed a data analysis on stored archival MAP CA assessment data from 2009-2012. The study was affected by attrition due to students leaving the school(s) for various reasons. Middle School B (MSB) students were acknowledged as the control group to compare MAP CA assessment scores against the co-taught students from Middle School A (MSA). Ten regular education teachers, seven special education teachers, and six administrators were involved in this study. Although the same MAP CA assessments were given to students, the practices and procedures of the control group teacher in regards to assessment preparation may have varied greatly from the teachers of the co-taught classroom.

Schools used for Comparative Study

Middle School A (MSA) and Middle School (MSB) are middle schools in a Midwestern suburban school district. The mission of the school district is to be a learning community where all students reach their full potential. The school district covers over 150 square miles and is located in the state of Missouri.

Research Approach

Following approval from the University's Instructional Review Board (reference number 424096-2), the researcher collected the data from two co-taught classrooms that were taught by the researcher and other communication arts and special education teachers in MSA as well as data from communication arts and special education teachers in MSB. Next, the researcher obtained a list of unique identifiers for a list of students who attended Middle School A and Middle School B for the school years 2009-2012. Next, the researcher obtained fifth through seventh grade MAP CA assessment scores for each of the years. Once this was completed, the researcher worked with the school counselors to determine which years each of the students participated in communication arts co-taught classrooms (content teacher(s) and special education teacher) for the entire year prior to the annual MAP CA assessment. The next step was to run the data. As the dependent variable, MAP CA scale score, was measured three times at 5th grade, 6th grade, and 7th grade, for each student, the three MAP CA scale scores for each student are related. A model that takes into account the correlation of the observations within each subject was necessary. Linear mixed-effects models (LMM) were proposed to model the relationship between the dependent variable and the independent variables of interest. In general, a linear mixed-effects model is any model that satisfies (Verbeke, G. and Molenberghs, G. , 2000):

$$\boldsymbol{Y}_i = \boldsymbol{X}_i\boldsymbol{\beta} + \boldsymbol{Z}_i\boldsymbol{b}_i + \boldsymbol{\varepsilon}_i,$$
$$\boldsymbol{b}_i \sim \boldsymbol{N}(\boldsymbol{0}, \boldsymbol{D}),$$
$$\boldsymbol{\varepsilon}_i \sim \boldsymbol{N}(\boldsymbol{0}, \boldsymbol{R}_i),$$
$$\boldsymbol{b}_1, \dots, \boldsymbol{b}_N, \boldsymbol{\varepsilon}_1, \dots, \boldsymbol{\varepsilon}_N \text{ independent},$$

where $\boldsymbol{Y}_i$ is the n_i-demensional response vector for subject i, $1 \leq i \leq N$, N is the number of subjects, $\boldsymbol{X}_i$ and $\boldsymbol{Z}_i$ are $(n_i \times p)$ and $(n_i \times q)$ dimensional matrices of know covariates, $\boldsymbol{\beta}$ is a p-dimensional vector containing the fixed effects, $\boldsymbol{b}_i$ is the q-dimensional vector containing the random effects, and $\boldsymbol{\varepsilon}_i$ is an n_i-dimensional vector of residual components. $\boldsymbol{D}$ is a $(q \times q)$ covariance matrix and $\boldsymbol{R}_i$ is a $(n_i \times n_i)$ covariance matrix.

In this study, fixed effects included in the LMM were:

- Main effects: grade, school, ethnicity, IEP, free/reduced lunch, gender (gender is included as a control variable);
- Two-way interaction effects: grade X school, grade X ethnicity, grade X IEP, grade X free/reduced lunch, school X ethnicity, school X IEP, school X free/reduced lunch;
- Three-way interaction effect: school X grade X ethnicity, school X grade X IEP, school X grade X free/reduced lunch.

No random effects were constructed. The compound symmetry (CS) covariance structure was used to model the dependence between observations from subject i. The F test based on the type III estimable functions for each effect is used to test if the effect of a term might be statistically significant, under the assumption that the sampled populations are normally distributed. In general, the null and alternative hypotheses for testing each effect are:

H_0: There were no differences between population means at each level of the factor of interest.

H_a: There were differences between population means at some level of the factor of interest.

In general, without further specification, a p-value less than 0.05 indicates that the effect is statistically significant. If the effect of a factor with more than two levels is significant, pairwise comparison was performed to see which two levels are statistically significantly different. To control for the family wise error rate, the Bonferroni procedure is implemented.

Estimated marginal means and the associated standard error (SE) for each factor were reported. Estimated marginal mean of a factor is the mean response of the factor after adjusting for any other variables in the model. An alpha level of .05 was used as the level of significance on all tests to determine whether student achievement differences exist in treatment and/or comparison groups by regular education or special education, free/reduced lunch, or minority student status.

Anonymous surveys submitted to the researcher through the school mail delivery system were the primary means of collecting data from teachers and administrators whose students were subjects in the study. These surveys were collected to ensure regular education teacher, special education teacher, and administrator comparability for the study. The surveys were condensed into chart form with averages from each of the three groups and are presented in both narrative and non-linguistic forms for this study. The survey results show that all three groups are very closely related and educator/administrator experience/background did not impede or invalidate the results of the study.

Assumptions

There was one assumption that this researcher made based on her experience with co-teaching at the middle school level. The assumption is that the co-teaching method of instruction will help all students' standardized MAP CA assessment scores. This assumption was reached due to the performance of students' on formative and benchmark assessments in the researcher's classroom. The researcher noticed data results that showed a greater increase in student performance on the formative and benchmark assessments by those students who were engaged in a co-taught setting compared to those who were in a traditional setting.

Rationale and Significance

The rationale for this study was to add to the body of knowledge about co-teaching which would influence administrator and teacher perceptions about the effects of co-teaching for both regular and special education students and teachers. The study showed the effects that co-teaching had to impact student achievement scores as measured by the standardized MAP CA assessment. This may aid educators in how they structure their instruction to prepare students for similar high-stakes assessments.

Chapter Two

Review of the Literature

Introduction

The purpose of this case study was to research whether a co-taught classroom setting or a traditional classroom setting had a greater positive impact on student achievement on a mandated standardized assessment. The objective was to investigate both regular education and special education students' scores as well as scores by free/reduced lunch students and minority students on the Missouri Assessment Program (MAP) Communication Arts (CA) assessment. This study analyzed data from a three-year time period comparing the same students in each of the classroom settings. This helped to alleviate issues of internal validity, and a three-year longitudinal study lends itself to be a more reliable measure than a one-year study. The researcher compared the students' difference in achievement scores from their year(s) in a traditional model to those year(s) in a co-taught model classroom. This study used a quantitative approach in the study that included the data for students at Middle School A and Middle School B grades sixth through seventh. The researcher drew conclusions to the research questions: Does the co-teaching model(s) of instruction make a significant difference in the achievement of regular education and special education students' scores on the standardized MAP CA assessment in Middle School (grades 6-7) compared to the traditional model? Does the co-teaching model(s) of instruction make a significant difference in the achievement of free/reduced lunch students' scores on the standardized MAP CA assessment in

Middle School (grades 6-7) compared to the traditional model? And, does the co-teaching model(s) of instruction make a significant difference in the achievement of minority students' scores on the standardized MAP CA assessment in Middle School (grades 6-7) compared to the traditional model?

Cook and Friend (1995) define co-teaching as "A direct classroom instructional model utilized by one or more regular classroom teachers and possibly a special education teacher. In a general educational setting, this model can also be facilitated by two teachers with the same curriculum or by developing a cross-curricular thematic instructional unit" (p. 3). For this study, both two content area teachers teaching together in one room and one or more content area teachers teaching with a special educator in the same room were classified as co-teaching.

One reason the researcher chose to use the MAP CA assessment is that it is part of each school improvement plan (SIP) in this district to increase student MAP CA scores in order to meet adequate yearly progress (AYP) as mandated by No Child Left Behind (NCLB). School Improvement Plan (SIP) is defined as "A written plan that a school develops to improve student performance in identified areas, using data and researched-based best practices to make academic gains within a school. These plans are usually submitted to district and state officials to be certain that the school meets adequate yearly progress goals." ("School Improvement Plan," 2011)

The school's Adequate Yearly Progress (AYP) is "A statistical target number established annually by the Missouri Department of Elementary and Secondary Education that gauges student proficiency in academics, graduation, attendance and

participation (subgroup) rates of schools and districts." ("Adequate Yearly Progress," 2011)

This was set in place due to No Child Left Behind (NCLB) "Enacted as the Elementary and Secondary Education Act by the United States Congress in 2002, this mandated federal program was developed to drive the improvement of schools by increasing the criterion of accountability to states, offering parents a choice in schools that their children may attend, and measuring student achievement through assessment focusing on mathematics, reading and science." ("No Child Left Behind Overview," 2011)

This new era of accountability has led to the development of the professional learning communities (PLC's) which were adopted in the School District in 2004. The PLC's encourage educators to use data from formative and summative assessments as well as yearly assessments that influence AYP to drive student instruction. This is called data driven instruction or backward design. Wiggins and McTighe (2001) define backwards design as "A curricular planning method used by teachers that designs lessons and assessments around curricular standards and goals" (p. 78). Although data driven instruction is relatively new, and emphasis on student outcomes as measured by these high-stakes assessments with implications for the school dependent upon these is also new, the idea of co-teaching is one that has been around for quite a while. It had not become popularized until the late 1980's when it was re-examined and used to introduce special education students into the regular education classroom setting (Friend, Cook, Hurley-Chamberlin & Shamberger, 2010). This was due to the passing of Individuals with Disabilities Act of 1997 (IDEA) and

NCLB which forced educators to solve the challenge of how to give all students quality instruction in one classroom.

Many American schools are using a co-teaching model to meet the regulations for inclusion, which were set in place by legislation. However, in a few rare instances, a co-teaching model is used by content-area teachers in the general education setting. The common perception of co-teaching though, is that of the content teacher paired up with the special education teacher, which is evidenced throughout the current literature. When co-teaching is implemented by the two content-area teachers it is still called co-teaching, but can also be labeled as collaborative, cooperative or team-teaching. (Cook & Friend, 1995). For this study, it was necessary to examine the current research to determine the key factors of co-teaching and the effects that have been studied to this point.

History of Co-Teaching

Before one can examine the current realities of co-teaching, it is important to understand the background and history for this model of instruction. The idea of co-teaching was born in the 1950's by educator Dr. Junior Loyd Trump. Trump did post-graduate work at the University of Chicago, where John Dewey had established the University's Educational Laboratory Schools. Trump's education was heavily influenced by Dewey's philosophies and practice (Shields, 1998).

Trump was an educator first, and then he transitioned to become an administrator and was a member of the National Association of Secondary School Principals (NASSP). In the mid-1950's America was facing an extreme shortage of

qualified secondary school teachers. The NASSP determined that if this shortage were not quickly and effectively addressed, the quality of education in U.S. schools would rapidly decline. Due to these fears, the association created the Commission on the Experimental Study of the Utilization of the Staff in the Secondary Schools. In 1955, the association chose J.L. Trump to be the director of this committee (Shields, 1998).

Trump and the committee wanted to seek answers for the following changes that could be made to improve instruction despite the shortages of teachers. The committee had volunteer schools run studies which implemented large-group presentations, follow-up review lessons for smaller groups of students, and for individualizing instruction for those who were not mastering the content. Secondary schools leapt at the chance to participate in the study for the commission as a way to relieve the pressures caused by the severe teacher shortage in secondary education (Shields, 1998). His resolution helped the teacher shortage by having two qualified educators share a large space with more students than would have been able to be accommodated in two smaller rooms. The teachers would teach together in the large space and then if small group work was needed, one teacher would pull the group to the side to work with these students while the other teacher would continue instruction with the larger group of students (Shields, 1998).

Following his work with the committee, Trump felt that it was still important to focus on helping to improve the structure and learning environment for secondary schools. Trump felt that the team-teaching model would improve instruction by allowing teachers to work together to come up with what is best for the students

rather than working in isolation. Shields (1998) stated, "Teaching was to be organized to be more efficient and effective. Team teaching and teacher assistants would be utilized to develop the full professionalization of teaching" (p. 123). Although Trump's idea was created over fifty years ago, educators today can see the value and merit of this innovative idea.

Co-teaching Beliefs and Methods

The education system is no longer facing an overall teacher shortage; however, educators' today struggle with meeting the needs of all students in one classroom and making sure that these students are well prepared for the high-stakes assessments, which are mandated by legislation. Today's educators feel a very real pressure to ensure that students are reaching set standards of achievement in the classroom. Authors Mastropiere, Scruggs, Greatz, Norland, Gardizi, and McDuffie (2005) state, "All teachers were reluctant to stray from the guidelines, felt pressure to move through the content at a rapid pace, and felt pressure to have all their students pass high stakes tests" (p. 266). Assessments have become a driving force for schools today and the curriculum has become a reflection of what state standards have said are important. These authors are not the only ones who believe that the standards are impacting teachers and students; authors Walsh and Jones (2004) state, "The standards reform movement alone has revolutionized what is being taught and assessed, as well as what students are expected to learn and do before graduation" (p. 15).

Creating lessons and assessments that align with the standards can be daunting and co-teachers may find it a relief to have someone to share the burden. Utilizing backward design strategies, teachers take what standards are expected on the MAP test, create benchmarks that align with those standards, and then create lessons to prepare students for the benchmarks. Although it seems straight forward, many teachers feel restricted by the tests and feel that they have to move on to the next benchmark or they will not have covered the material for the MAP test in time, leaving those students who did not get it on the benchmark no time for re-teaching. Researchers Mastropieri, Scruggs, Graetz, Norland, Gardizi, and McDuffie conducted a 2005 case-study concerning co-teaching and the pressure of high-stakes assessments. They concluded:

> Where high stakes testing was a factor, classroom instructions and collaborative efforts were much different. In some situations, specific guidelines were provided that recommended initiating and ending dates for all content within particular grade levels, irrespective of whether students were ready to move on or not. Such guidelines directly influence the pace of instruction that teachers maintain. (p. 268)

Co-teaching for differentiation may alleviate this issue. By setting formative exams half-way through the lesson plans for a benchmark, co-teachers are able to differentiate instruction based on the data analysis from the formative assessment. In this way, students who are not grasping the concepts can stay for re-teaching from content- teacher A, while those who have already mastered the concepts can move on to a deeper understanding through enrichment instruction from content- teacher B. In

her book, Tomlinson (1999) states, "In a healthy classroom, what is taught welcomes youngsters as reasoning members of the human family, not to a standardized test" (p. 31). She believed that to do this through differentiation was essential to meeting the needs of each individual student. In 2004 she wrote, "Ensuring that what a student learns, how he/she learns it, and how the student demonstrates what he/she has learned is a match for that student's readiness level, interests, and preferred mode of learning" (p. 188). Tomlinson later writes about the student responsibilities in a co-taught classroom and how students must be prepared to advocate for themselves and not wait around for a lifeline. She states, "For you to successfully manage a differentiated classroom, your students must know that it is never okay for them to just sit and wait for help to come to them, or to disrupt someone else" (p. 36).

Once the students are grouped by their ability it is the responsibility of the two co-teachers to keep them actively engaged and learning. In their article, authors Murawski and Dieker (2008) say, "Students become more motivated to learn when they are enjoying themselves" (p. 46). They continue the article by declaring, "Two teachers means that two people can help figure out how to 'shake up' the lesson and ensure maximum student engagement" (p. 45). Co-teaching can help educators to differentiate to meet students at their ability level and scaffold information, and can help to keep students on their toes by not knowing who is going to be their teacher or how they are going to be learning that day. Co-teachers can help each other help their students. Co-teaching also gives the teacher someone else who can help when a student is on his or her nerves, or witness an incident good or bad. Kohler-Evans (2006) showed insight to this in her article and states:

> All teachers experience those wonderfully funny, rich, teachable moments where one's fondest desire is to have someone else see it, too. Here is the chance to share some of the best teaching moments with someone else, someone who understands the context and the participants (p. 262).

Co-teaching gives teachers time with another teacher throughout the day, so that one no longer feels isolated and left in the world of children as the only adult. It allows teachers to form a bond that helps them to teach their students better than they could alone.

Co-teaching for differentiation is just one method of co-teaching instruction, it can be seen as a hybrid of parallel teaching and alternative teaching. In parallel teaching, the teachers would divide the class and teach the two groups the same content, sometimes using different formats but not always. For alternative teaching, the teachers divide the students into groups (one is usually larger than the other) and both teachers instruct the same content using different methods; usually the smaller group is in need of more intensive instruction due to a lack of mastery for that specific content. Another very popular method is team teaching. In this method, two teachers are teaching a lesson together; usually one will lead the discussion while the other circulates to check for understanding, deals with discipline issues, and provides support throughout the lesson (Cook & Friend, 1995).

Establishing the Co-Taught Classroom

All teachers share space with other educators, faculty lounges, cafeteria, library, computer labs, auditorium, and outdoor learning facilities to name a few. Sometimes these shared spaces can be a source of tension amongst educators. For example, two teachers want to use the auditorium for a project on the same day, or both Communication Arts classes want the library for research papers. Teachers must find a way to work through these issues and any others that may arise. These stressful situations may be part of the reason teachers are hesitant to adopt the co-teaching method. Sharing space, resources, and students can be a daunting task.

Every year more expectations are being put on the shoulders of teachers. Lawmakers set such high standards with the passage of No Child Left Behind that many teachers feel as though their teaching style and methods are being left behind in the push for scores on high-stakes testing. Co-teaching offers an opportunity for teachers to share this task of preparing students for these tests and meeting school AYP in their content area. The downside of co-teaching is getting over the fear of sharing time, resources, and space with another teacher. This can be especially true at the secondary level where teachers are experts not only in instructional methods and strategies but also in their content area. In their article, authors Murawski and Dieker (2004) state, "Secondary teachers by nature are often more territorial because of the subject-specific environment, and are often accustomed to autonomy in their classrooms and not to rely on others' ideas of how the class may best be instructed" (p. 54).

It is imperative that both teachers feel that they are equal contributors and stakeholders in the classroom. With administrative support, best practice research, training, and movable walls, teachers will have everything they need to make co-teaching a successful enterprise. Authors Rea and Cornell (2005) talk about sharing physical space and resources in a co-taught classroom, "If these elements are not in place, consider what that says both to students and to teachers: 'There isn't room for me; I do not belong here'" (p. 33).

Therefore, administrators must do their best to provide the space needed for successful implementation, and make sure they have found the best people to be open to accepting the task of co-teaching. When two teachers are put together, they have various background experiences, knowledge of methods and strategies, student behavior expectations, and instructional practices. Sileo's 2011 article states:

> Each person enters the relationship with diverse individual and cultural mores, which must mesh to form a harmonious home. Co-teachers come together with dissimilar personal and professional values that they must identify, state, and combine in an effort to create positive academic and social climates for all students in their classroom setting (p. 34).

Author Bouck also supports this sentiment in her 2007 article. She reflects upon bringing two teachers together by saying:

> Teachers, like the ones in the present study, need to consider how they can both share and divide the physical, instructional, and management and discipline spaces that exist within classes. The sharing and dividing of those

> three spaces is important to making both the relationship and the co-taught classroom work (p. 50).

This joining of individual teachers into a harmonious classroom can be seen as a union of sorts. Friend and Cook (1996) state, "In short, we agree with veteran teachers who tell us 'Co-teaching is like a professional marriage'" (p. 50).

Authors Keefe, Moore, and Duff (2004) speak of the anxiety associated with combining teachers into one classroom successfully in their article. They said, "The concept of collaborative teaching can be extremely unnerving for teachers because it forces them to adjust their teaching styles to accommodate not only the students in the class, but also the extra adult in the room" (p. 37).

Despite anxiety and different backgrounds, administrators must stress the importance of maintaining professionalism and respecting the other teacher's ideas, methods, and practices. Authors Rice, Drame, Owens, and Frattura (2007) wrote, "Although this may seem to be obvious, the importance of courtesy and professionalism cannot be emphasized enough; they go a long way toward laying a foundation for a strong co-teaching relationship" (p. 13). These authors are not the only ones who believe professionalism and mutual respect is paramount in a successful co-teaching classroom. Author Murawski (2006) agreed with this ideal in her study. She states that, "….the very nature of co-teaching relies heavily on the personalities and classroom environments created by each teacher involved" (p. 242).

Once the co-teaching union has been created, expectations have been developed, and an understanding of the shared values, beliefs, practices, and instructional strategies are aligned a truly remarkable thing happens, a classroom with

two well-prepared teachers who can help each other to give the best instruction possible to the students. Teachers will develop an understanding of each other's methods and strategies, and be able to support the weaknesses and strengths of each other, giving students better instruction than they would have received from either teacher independently. Kain (2006) talks of the successful unions of teachers in his article. He declares that, "Effective teams come together to accomplish important purposes that can be addressed through their complimentary skills and knowledge" (p. 54). Authors Cook and Friend (1995) agreed by stating:

> More seriously, co-teachers talk about the notions that they can relieve each other during instruction or to help clarify their partners' presentation, that they share the understanding that can only come from having been there for the best and worst moments of instruction, and that they can work together to more sensitively gauge student needs in any particular moment of instruction. (p. 4)

The research is overwhelmingly in favor of the co-taught classroom; administrators should take advantage of the successful co-teaching occurring in their building everyday by sharing the results of the co-taught experiences with all faculty. This helps to aid the camaraderie and climate of the building and encourages other teachers to find opportunities to combine their teaching talents. At the University of Science and Arts of Oklahoma a co-teaching faculty member, Shafer (2000) wrote this of her co-teaching experience. "Generally, team teaching encourages faculty to perform exceptionally well. The presence of professional peers serves as subtle

reinforcement to keep lecture notes current, grade conscientiously, and resist the temptation to get by with minimal effort" (Shafer, 2000).

A major factor in creating change to be accepted is the climate of the school. If the climate is not one of acceptance, and motivation to meet the needs, even if those mean change, then it will be hard for administration to get initiatives implemented. All change must align with the vision and mission of the school, which must be supported by the faculty and staff. Teachers must unite with this shared vision and be willing to step up for the challenges that arise. Authors DuFour and Eaker (1998) wrote:

> When school personnel make a commitment to demonstrating certain attitudes and behaviors in order to advance the collective vision of what their schools might become, they are, in effect, describing what they hope will be the visible manifestations of their schools' cultures. (p. 134)

Therefore, administrators must continually guide faculty along the path of shared vision and acceptance to the change necessary to continue that vision's success in the future.

Co-teaching can be seen as a tool that enables drastic change in teachers' mindsets, can aid student achievement, supports the vision of the school, and does not require a change in school resources or spending. Staff members must be open to the possibility of sharing their students with another teacher. Administrators must have insightful selection of staff members, and be able to pair those up who would be able to implement the co-teaching model successfully. In their journal article, authors Walther-Thomas, Bryant, and Land (1996) believed that administrators should,

"Whenever possible, select capable volunteers for co-teaching assignments…Both co-teachers must be capable contributors to make these partnerships equitable and productive" (p. 258). Administrators must be aware that change is inevitable, and schools must meet the changing needs of our students and society. Reeves writes that the administration needs to be aware of the change that is needed, and work toward it step by step. In his book he stated "If, however, you are committed to effective change, then persistence through initial challenges to achieve the essential short-term wins will be necessary, even when that persistence is unpopular" (p. 48).

Teachers can also be instrumental in bringing on board support for the co-teaching initiative. If an administrator in the building is not on board with a model, successful teacher implementation, which garners positive student assessment results, will probably help to sway the administrator's opinion of a co-teaching model. Administrators must do observations and evaluations of faculty. If the teachers are aware of the hesitancy to support co-teaching, they should meet with the administrator prior to observations to go over planning, objectives, and assessments for the lessons. By voicing concerns and interest in assistance, the administrator will feel more involved in the process and be excited by the improved instructional abilities of the co-teaching partnership. Rea (2005) agrees with this notion in her article. She states, "If you share information about strategies and then ask your administrator to watch you implement them, you have set up a powerful example of professional growth for your supervisor to observe" (p. 312).

Once all administrators are on board they will help to spread the word that this method is working and that others should employ it when opportunities arise.

Authors Murawski and Dieker (2008) also believe that it is imperative to acknowledge publicly the successes and student gains due to the implementation of co-teaching. "Be certain that you tell everyone who will listen what is working. Co-teaching often spreads at a school when teachers hear about the benefits and successes of students and faculty" (p. 47).

Co-teaching teachers must sometimes take the reins and help to drive through the initiative. Tomlinson and Imbeau (2010) wrote, "A teacher who is willing to be a leader of principals, supervisors, or other administrators has the opportunity to benefit not only those individuals, but also those colleagues who are affected by their practice" (p. 67). Teachers can influence change in the building environment, and help to enhance staff relations and improve the climate.

Outcomes of Co-Teaching

When deciding if establishing co-teaching would be valuable, it is important to look at the student outcomes of reported studies in this area. Investigations of co-teaching on academic outcomes on the elementary level have yielded mixed results (Banerji & Dailey, 1995; Saint-Laurent, et. al., 1998; Welch, 2000). Saint- Laurent et. al. (1998) reported significant improvement in reading and math for the students with and without disabilities, but not the students with learning disabilities in the at-risk group. These authors concluded that the empirical debate on in-class models should continue.

Using a co-teaching model in two different elementary schools, Welch (2000) collected pretest and posttest data on student academic achievement. Paired -tests

showed significant improvement in reading skills of the students without disabilities, although there was also improvement of scores for students with disabilities it was not at a statistically significant level. Banerji and Dailey (1995) also looked at the gains in achievement of elementary students with and without disabilities receiving instruction in co-taught classrooms. Although the gains of the students with learning disabilities were not statistically significant, the gains of the students with normal achievement were. This was on a reading test comparing pre-test scores and post-test scores of students receiving co-taught instruction from a regular educator and special educator.

Klinger, Vaughn, Hughes, Schumm, and Elbaum did a quantitative study in 1998, measuring the academic progress for elementary students including those labeled as learning disabled (LD). "Results revealed that students with LD improved at statistically significant levels in reading, and that LD students made greater gains in reading than low to average achieving students" (p. 158). The study used a pretest-posttest group design and achievement was measured using Basic Academic Skills Samples for reading, Kaufman Test of Educational Achievement, a reading inventory, and math concepts assessment. None of the above measures are mandated by the state or considered a high stakes assessment. In the 1998 study by Affleck, Madge, Adams, and Lowenbraun, math, reading, and communication arts achievement for LD elementary students in pullout program vs. a co-taught model showed no significant difference in student scores (as measured by classroom assessments) when comparing the groups from both settings.

Boudah, Schumaker, and Deshler's 1997 article concluded that co-teaching does seem to have an effect on student outcomes but not necessarily in the desired directions in all instances. This empirical study took place in the secondary setting and showed that the test scores of the students with low average achievement improved slightly, and the scores of the students with disabilities decreased slightly. This student achievement was only measured in strategic skills that were assessed using test/quiz performance.

Rea, McLaughlin, and Walter-Thomas (2002) looked at the effects of co-teaching in the middle school setting. They found that the eighth grade students with disabilities earned higher report card grades, lower disciplinary referrals, and had higher attendance rates than those with disabilities in a resource room and not inclusive classroom setting. Not only that, but when examining learning disabled (LD) students in the co-taught versus pullout settings, the LD students achieved higher scores on the communication arts and math sections of the Iowa Test of Basic Skills (ITBS) which is comparable to the MAP assessment. When using the measure of course grades, this is not as reliable a measure as the state exams, the LD students in the co-taught settings achieved significantly higher course grades than their counterparts in a pull-out program.

Kohler-Evans had the following research findings listed in her article:

> Research findings have yielded mixed results on the effects of co-teaching. Some studies have indicated that students with disabilities showed larger gains in math and equal gains in reading when compared to students receiving pull out services (Bear & Proctor,

> 1990)…Boudah and colleagues (1997) found that Performance of students with high-incidence disabilities worsened during co-teaching. Other studies have indicated that for high-risk students with learning disabilities(Dieker, 1998) and students with disabilities (Rice& Zigmond, 1999; Welch, 2000), co-teaching is an effective practice. Even with these mixed results,77% of middle schools are using some form of co-teaching. (p. 260)

Van Garderen, Stormont and Goel did a 2012 meta-analysis that examined data from Murawski's 2006 study which featured pretest-posttest group design with a co-teaching model. This study too yielded mixed results. "On all standardized measures, no significant different in measures based on teaching arrangement" (p. 489). The study also revealed that when pulling the LD students' scores, there is a marked difference based on teaching arrangement. "Students with LD in the co-teaching arrangement maintained the same overall grade average, whereas student with LD in the mainstreaming condition decreased in their overall grades" (p. 490). The results that most apply to this study dealt with outcomes on standardized scores, "Students with LD in the co-teaching condition did better on reading and spelling scores, but had lower writing scores." (p. 489)

Fontana (2005) states, "Researchers are calling for more investigations into various aspects of collaborative teachings as a service delivery form and its effects on student achievement as compared to other service delivery models (Manset & Semmel, 1997; Marston, 1996)" (p. 20). This is evidenced throughout the literature because there is a gap concerning quantitative studies which measure academic

student achievement and included both regular and special education students' outcomes.

Chapter Three

Methodology

Purpose of Study

The purpose of this study was to compare middle school Communication Arts standardized test scores (Missouri Assessment Program, MAP) over a three-year period (2009-2012), in two regular education middle school communication arts programs, in a Missouri suburban school district. The researcher aimed to show that students participating in the two co-taught classroom settings (group one has two content teachers, or content teacher and special education (sped) teacher) performed better on the standardized assessment than those in a traditional classroom setting. The researcher compared the test scores of the students on the MAP CA assessment for sixth and seventh grades; however, the students' fifth grade scores were used as the pretest for all groups. Middle School A utilizes teaching in a co-taught setting (two content teachers) for all 6^{th} and 7^{th} grade communication arts courses. Middle School B follows a traditional classroom method of teaching for all courses. Both schools also utilize a co-teaching method with one content area teacher(s) and one special education teacher to meet the needs of the special education students in that building.

Schools in Comparative Study

Middle School A (MSA) and Middle School (MSB) are both in the same Midwestern school district. The mission of the school district is to be a learning community where all students reach their full potential. The District encompasses

over 150 square miles and is one of the largest school districts in the state of Missouri. Both schools used in this study come from an area with low (less that 10% transient rate and would have less than 10% of students removed from the study due to attrition) transient student population, and of low-middle to upper class socio-economic status.

Middle School A (MSA) has a student population of 770 students; of that eighty-seven percent of the students are Caucasian, 7% African-American, 4% Asian, and 2% are Hispanic. The yearly attendance rate for this school in 2010-2011 was 95.4%, and only 17.6% of students received free and reduced lunches compared to a state average of 42.3%. The student- to- teacher ratio was 18-1, and student- to-administrator ratio was 257-1. The average years of experience for the teachers at MSA were 14.8 and 100% of the staff had advanced degrees. (School Accountability Report Card, DESE)

Middle School B (MSB) has a student population of 789 students; of that eighty-two percent of the students are Caucasian, 10% African-American, 4% Asian, and 4% are Hispanic. The yearly attendance rate for this school in 2010-2011 was 94.6%, and only 20.7% of students received free and reduced lunches. The student-to-teacher ratio was 17-1, and student-to-administrator ratio was 263-1. The average years of experience for the teachers at MSB were 12.9 and 100% of the staff had advanced degrees. (School Accountability Report Card, DESE)

Table 1: Schools' Student Ethnicity Breakdown

School Year	Total Students	Asian	African-American	Hispanic	Indian	White
MSA 2010	770	3.8%	6.8%	2.2%	0	87.3%
MSB 2010	789	4.2%	9.9%	4.1%	.3%	81.6%
MSA 2011	767	3.4%	5.9%	2.2%	.1%	88%
MSB 2011	798	3.8%	11.8%	4.5%	.1%	79.7%

Table 2: Schools' Student Economic Status and Faculty Information

School Year	Total Students	Free/ Reduced Lunch	Average Years Experience	Student/ Teacher Ratio	Student/ Administrator Ratio	Certified Staff with Advanced Degrees
MSA 2010	770	17.6%	14.8	18/1	257/1	100%
MSB 2010	789	20.7%	12.8	17/1	263/1	100%
MSA 2011	767	19%	15.4	18/1	256/1	100%
MSB 2011	798	23.8%	13.2	17/1	266/1	100%

Why Middle School A?

In 1993, the Midwestern School District realized it was once again time to expand. Student populations were growing at a fast rate; new citizens joined the community from other St. Louis Metropolitan areas seeking safe, clean, and prosperous communities. Their expectations for great schools able to accommodate their children was a given, but the school district was not living up to their side of the

bargain. Student-to-teacher ratios were going above the district's desired level of 20-1 and the district knew it had to act fast to meet the needs of the students. The district decided to add two elementary schools and a new middle school within the next five years.

The new middle school was Middle School A (MSA), and it was to be led by a dynamic administrator. He was considered a progressive thinker and was constantly seeking the newest and most innovative best practice research and methods for both teachers and administrators. The administrator was very familiar with co-teaching, its current use for special education programs, and the possibilities it held for regular education teachers' application. He and his team of professionals set about to create a school that would use/employ a co-teaching model. The end result was Middle School A.

Middle School A has some unique physical aspects which lend themselves to the co-teaching model. Four rooms in every main level hallway have movable walls. Movable walls are those that are set in a metal track in the ceiling and can be moved to accommodate many different teaching arrangements. The room can be divided in halves, fourths, or a small room can be created in the center by the walls with a larger room on each side. These movable walls enable the teachers to change the room design based on the daily needs of the students.

Once the school was open, the administrators set out on a campaign of informing parents, teachers, fellow administrators, and students of the benefits of co-teaching. The building design allowed for 6th and 7th grade communication arts and social studies teachers to collaborate in new and exciting ways. These teachers

received professional development training the summer prior to the school opening. They attended a conference and brought the information back to the faculty for discussion during monthly faculty meetings. Administrators encouraged staff by providing them support, access to literature about co-teaching, and ideas for improving collaboration with the co-teaching model. (Speno, 2011)

Comparability of two schools of study

The researcher chose Middle School A for all of the reasons stated above. It was designed with the needs of co-teaching specifically in mind. The movable walls have made it an ideal environment for two content area teachers to be able to teach together every day or separately as needed. The professional development provided by the administrators and faculty has made the school aware of the benefits and best practice for implementation of this instructional model. The special education department chair frequently observes the co-taught special education classes to make sure that all the needs of students are being met and modifications are being made. Administrators and department chairs do walkthroughs and complete evaluations for all co-teachers to make sure that the model is being implemented with fidelity. However, it is not just MSA which has received professional development and participate in evaluations and walk-throughs which show the teachers are meeting expectations for implementation; this is provided and required by all schools in the district.

The researcher has been able to ascertain from administrators at Middle School B that their staff has received the same professional development for their co-

teaching with special education classrooms. This is evidenced by the teachers' yearly professional development logs that are submitted to administrators at the end of each school year. MSB and MSA administrators agree that the evaluation tools and expectations are nearly the same for both schools, but have slight differences based on each schools' school improvement plan. Both schools' administrative staff has evidence of all teachers', whose classes will be used in the study, evaluation tools show that they are meeting district and building teacher expectations. Teachers' observations and evaluations have excerpts which cite the cooperative teaching in their room and that co-teaching is evidenced throughout all school years of the proposed study.

Middle School B (MSB) is the most closely comparable school to MSA when looking at the Department of Elementary and Secondary Education's (DESE) website for the other middle schools in the district. The student population by ethnicity and socio-economic status are within a few percent of each other. The daily attendance rate is within one percent of each other, the student to teacher ratio is only one apart, both schools have 100% of teachers with an advanced degree, and the administrator to student ratio is very close as well. This school is the one that most nearly mirrors MSA, and therefore is the best choice to use when comparing student scores.

Looking specifically at the communication arts and special education teachers in the two schools of study, one can quickly see that they are very comparable in their years of experience, years in the district, years of co-teaching experience, and advanced degrees. The researcher obtained this information through the collection of anonymous and voluntary teacher surveys from the communication arts and special

education departments in each building. (Appendix A) All of the teachers in this study are female. There is a large difference in the total years teaching and years in district for the special education teachers, with School A having a significant amount more years of experience than School B. However, this is not true when comparing their years of experience in a co-taught room which School A only has one additional year of experience. Because the study is focusing on the special education teachers' ability in the co-taught room, the years of experience total and in district should not have an effect on the comparability of the two schools. The only other area that shows the two schools are not within one unit of measurement of each other is the advanced degrees. In this area School A has more advanced degrees for the regular education teachers than School B. Conversely, the special education teachers from School B have more advanced degrees than School A; therefore, the researcher believes that the differential in advanced degrees does not negatively impact or invalidate the study. The chart below shows the averages for the teachers in these departments from each school in the study.

Table 3: Teachers' Education and Work Experience

	Gender	Total Years Teaching	Years In District	Years Of Co-Teaching	Advanced Degrees
School A Regular Education	5 females	10	8	6	4 Masters 2 Ed. S. 1 Ed. D.
School B Regular Education	5 females	10	9	5	5 Masters
School A Special Education	3 females	18	16	11	2 Masters
School B Special Education	4 females	10	10	10	3 Masters

The next item of comparability to examine is the administrators' experience teaching and evaluating co-teaching. The researcher obtained this information through the collection of anonymous and voluntary administrator surveys. (Appendix B) The administrators from the two schools are very comparable. The only area in which they differ greatly is advanced degrees. Two School A administrators have their doctorates, while none of the administrators in School B have theirs. The chart below shows the averages for the administrators from each school in the study.

Table 4: Administrators' Education and Work Experience

	Gender	Total Years As Administrator	Years in District as Administrator	Years in Building of Study	Years Evaluating Co-Teaching	Years of Co-Teaching	Advanced Degrees
School A	2 Female 1 Male	12	11	10	9	2	3 Masters 3 Ed. S. 2 Ed. D.
School B	1 Female 2 Male	11	11	8	8	3	3 Masters 3 Ed. S.

The researcher felt that it was imperative to have a comparison school within the district for several reasons. Because the schools are in the same district they use the same teacher evaluation tool. (Appendix C) Since the administrators are using the same evaluation method, the researcher can easily see which classrooms are implementing the co-teaching methods with fidelity. Both schools use a walkthrough informal evaluation tool. (Appendix D) The walkthrough form is the same from both schools. This form indicates what part of the class period was observed, if it was co-taught (who was teaching), Marzano strategies utilized, and level of student engagement. The researcher was able to read through the observations for the teachers in the study. The teacher names were removed when given to the researcher, only the school, and regular education teacher, or special education teacher was left as indicators as to whom was being observed.

Observations from both schools showed positive comments for both regular and special education teachers. Comments made by administrators included: "Good grouping of students by ability for re-teaching.", "Love how you finish each other's

sentences.", "Kids were all engaged and on task.", "Students are able to follow lessons when given in multiple formats.", "Good use of space and teachers for remediation and enrichment.", "Love the way you work together.", "You guys really get it all covered between the two of you.", "Impressive how quickly you group/remediate/regroup.". All of these comments speak to the effectiveness and benefits observed in the co-teaching classrooms. The researcher found no comments criticizing the co-teaching method or implementation in the classrooms.

The second tool the administrators use to evaluate the teachers is the formal teacher evaluation tool for the district. The teacher evaluation tool has four areas which are evaluated with subsections for each. The ratings possible for each of the sections/subsections are met or have not met. The four sections are: knowledge of subject matter, instructional skills/competencies, classroom management, and professionalism. There are places for both the evaluating administrator and teacher to leave comments regarding the level of determined competency for the evaluation.

Another reason it is important to have two schools within the same district is that they both receive the same funding, resources, and professional development. The professional development for communication arts teachers is given to all middle school teachers on the same day and time. This ensures that all the teachers have been given the same instructions and tools for implementing the method appropriately in their classrooms. Also important is the fact that the teachers follow the same curriculum and curriculum map. All of the middle school teachers are teaching the same skills at the same time, and have quarterly common assessments across the district. The teachers all have the quarterly assessments and utilize backward design

to ensure that their students have received ample practice on those skills prior to the quarter formative. All classrooms also have a semester summative. When analyzing the data from the formatives and summatives, students at MSA and MSB have commensurate scores. There is not a noticeable gap between the two schools in any area on the tests. The last reason that it is important to have both schools from the same district is that both schools give the yearly MAP test in the same format/time schedule to its students.

Student Populations

The student population was chosen based on the unique environment and instructional methods used at Middle School A, and then Middle School B was chosen because it was the most comparable school in the district. These student populations are intact groups and are not random. In addition, because these schools are in a suburban Midwest school district, the results can only be generalized to other suburban Midwest middle schools with similar student demographics and similar instructional delivery methods.

2010 Middle School A Student Sample

In 2010, the sixth grade student population at Middle School A was 241 students. Of those students, 15 were African American, 7 were Asian, 9 were Hispanic, none were Indian, and 210 were Caucasian. The seventh grade student population was 261, and 11 students were of Asian descent, 17 were African American, 4 students were Hispanic, none were Indian, and 228 were Caucasian.

2010 Middle School B Student Sample

Middle School B's sixth grade had a population of 254. The African American population was 26 students, Asian was 10, Hispanics were 5, 2 were Indian, and 211 were Caucasian. The seventh grade student population was 258 that was comprised of 12 Asian students, 28 African Americans, 17 Hispanics, none were Indian, and 201 were Caucasian.

Table 5: 2010 Student Ethnicity Break-down by Grade

School grade	total students	Asian	Black	Hispanic	Indian	White
MSA 6th	241	2.9%	6.2%	3.7%	0	87.1%
MSB 6th	254	3.9%	10.2%	2%	.8%	83.1%
MSA 7th	261	4.2%	6.5%	1.5%	0	87.4%
MSB 7th	258	4.7%	10.9%	5.4%	0	77.9%

2011 Middle School A Student Sample

Middle School A's sixth grade 2011 student population was 255 students. During that year, there were 9 Asian students, 10 African Americans, 5 Hispanic students, no Indian students, 230 Caucasian students, and one identified as "other." The seventh grade student population was 250 and there were 7 seven Asian students, 16 African American students, 9 Hispanic, one Indian, and 217 were Caucasian.

2011 Middle School B Student Sample

In 2011, Middle School B had a sixth grade student population of 256. The African American population was 34 students, Asian was 9, Hispanics were 14, none were Indian, 196 were Caucasian, and 3 were of other ethnic backgrounds. The seventh grade student population was 269 that was comprised of 10 Asian students, 32 African Americans, 7 Hispanics, 1 Indian, 218 were Caucasian, and 1 was of other descent.

Table 6: 2011 Student Ethnicity Break-down by Grade

School grade	total students	Asian	Black	Hispanic	Indian	Other	White
MSA 6th	255	3.5%	3.9%	2%	0	0	90.2%
MSB 6th	256	3.5%	13.3%	5.5%	0	.8%	76.6%
MSA 7th	250	2.8%	6.4%	3.6%	.4%	0	87.4%
MSB 7th	269	3.7%	11.9%	2.6%	.4%	.4%	81%

Instrument

The MAP assessments are required under Senate Bill 380, often referred to as the "Outstanding Schools Act," the state school-reform law enacted in legislature in 1993. This bill required the State Board of Education to adopt no more than 75 academic performance standards, which established the knowledge, skills and competencies necessary for students to "successfully advance through the public

elementary and secondary education system of this state; lead to or qualify a student for high school graduation; and prepare students for postsecondary education or the workplace or both." These "Show-Me Standards" are guides to what students should be able to know and to do. There are 40 knowledge standards and 33 performance standards. http://dese.mo.gov/divimprove/assess/grade_level_resources.html

About the MAP

The Missouri Assessment Program assesses students' progress toward mastery of the Show-Me Standards which are the educational standards in Missouri. The Grade-Level Assessment is a yearly standards-based test that measures specific skills defined for each grade by the state of Missouri. The assessment also includes sections from the TerraNova survey, a national norm-referenced test, which is used to compare how well students are performing compared to their peers across the country. All students in grades 3-8 in Missouri will take the grade level assessment. Communication Arts and Mathematics are administered in all grades. http://dese.mo.gov/divimprove/assess/grade_level_resources.html

What kinds of questions are on the test?

There are three types of questions on the Grade-Level assessment: Multiple choice items are composed of selected response questions developed specifically for Missouri/or the survey portion of *Terra Nova*, a nationally normed test. Constructed response items require students to supply an appropriate response

rather than making a selection from a list of choices. Performance events are longer, more demanding tasks requiring students to work through problems, experiments, arguments, or extended pieces of writing.
http://dese.mo.gov/divimprove/assess/grade_level_resources.html

MAP Scale Score

CTB/McGraw-Hill uses the students' correct responses to derive a MAP scale score. The scale score describes achievement on a continuum that in most cases spans the complete range of Grades 3–8. These scores range in value from 455 to 875 for Communication Arts, 450 to 885 for Mathematics, and 470 to 895 for Science. Within a content area, scores from adjacent grades may be compared. Scale scores cannot be compared across content areas. For example, it is appropriate to compare a student's Grade 5 Mathematics scale score with his or her Grade 6 Mathematics scale score. The MAP scale score determines the student's achievement level. The MAP scale score ranges for each achievement level can be found beginning on page 5 of this guide. Within a content area, scale scores can be added, subtracted, and averaged. A student receives a MAP scale score when he or she makes a valid attempt in any content area. http://dese.mo.gov/divimprove/assess/documents/asmt-gl-gir-spring-2012.pdf

Instrument Selection

The standardized MAP assessment was chosen as the metric to determine which instructional model effects student achievement in Communication Arts. The first reason the MAP CA assessment was chosen as the metric is that all grade levels use backward design based on this assessment to determine their course map for the year. The course map details the order and time spent for each grade level expectation which is tested on the MAP CA assessment. The validity and reliability of the MAP CA assessment has been performed and reported by a reliable resource and the school district has chosen this metric as an accurate assessment of Communication Arts achievement. Finally, all teachers in this study are given the same training to prepare students for these assessments each year. The teachers have the same resources available to them to ensure students have the same opportunities to learn the information required. Teachers are not allowed to see the test prior to the day of assessment and teachers are not allowed to assist students in completing the test.

"Meaningfulness" or "Validity" of MAP scores

The following information regarding the meaningfulness or validity of MAP scores was accessed via the website: http://dese.mo.gov/divimprove/fedprog/discretionarygrants/ReadingFirst/DMAP.pdf

DESE assures the meaningfulness or validity of the MAP score indices of proficiency in accordance with the state standards through methodological and rigorous testing development procedures. "CTB and DESE have developed MAP

assessments in accordance with accepted procedures and criteria (as articulated, for example, in Standards for Educational and Psychological Testing, AERA, APA, NCME, 1985), intentionally aligning MAP assessments to the specific Show-Me Standards being measured at that grade and subject area."

"The process of collecting evidence for the meaningfulness of assessment data is ongoing, as is the process of ensuring meaningfulness through sound test-development procedures. CTB and DESE will continue to conduct validity studies on future editions of the MAP and to build meaningfulness into results by adhering to industry standards during test-development stages. However, we have very firm evidence that the MAP assessments yield scores that are valid, given the stated purposes of the program. Scores provide information about students' attainment of the Show-Me Standards and can be appropriately used to fulfill the charges stipulated in the Outstanding School Act."
http://dese.mo.gov/divimprove/fedprog/discretionarygrants/ReadingFirst/DMAP.pdf

To view the CLEAR consequential validity study, Communication Arts, please access the following link: http://dese.mo.gov/divimprove/assess/tech/

Design

For the study, the researcher used a nonrandomized control group pretest-posttest design. In this design, the sample was not randomly assigned to groups, but was made up of intact groups that did not disrupt the existing research setting. By doing it this way, it increased the external validity by decreasing the reactive effect of the experimental procedure. The researcher obtained fifth through seventh grade

MAP CA assessment scores for each of the years. Once this was completed, the researcher worked with the school counselors to determine which years each of the students participated in communication arts co-taught classrooms (content teacher(s) and special education teacher) for the entire year prior to the annual MAP CA assessment. The next step was to run the data. As the dependent variable, MAP CA scale score, was measured three times at 5th grade, 6th grade, and 7th grade, for each student, the three MAP CA scale scores for each student are related. A model that takes into account the correlation of the observations within each subject was necessary. Linear mixed-effects models (LMM) were proposed to model the relationship between the dependent variable and the independent variables of interest. In general, a linear mixed-effects model is any model that satisfies (Verbeke, G. and Molenberghs, G., 2000):

$$\begin{gathered}\boldsymbol{Y}_i = \boldsymbol{X}_i\boldsymbol{\beta} + \boldsymbol{Z}_i\boldsymbol{b}_i + \boldsymbol{\varepsilon}_i, \\ \boldsymbol{b}_i \sim \boldsymbol{N}(\boldsymbol{0}, \boldsymbol{D}), \\ \boldsymbol{\varepsilon}_i \sim \boldsymbol{N}(\boldsymbol{0}, \boldsymbol{R}_i), \\ \boldsymbol{b}_1, \ldots, \boldsymbol{b}_N, \boldsymbol{\varepsilon}_1, \ldots, \boldsymbol{\varepsilon}_N \text{ independent},\end{gathered}$$

where $\boldsymbol{Y}_i$ is the n_i-demensional response vector for subject i, $1 \leq i \leq N$, N is the number of subjects, $\boldsymbol{X}_i$ and $\boldsymbol{Z}_i$ are $(n_i \times p)$ and $(n_i \times q)$ dimensional matrices of know covariates, $\boldsymbol{\beta}$ is a p-dimensional vector containing the fixed effects, $\boldsymbol{b}_i$ is the q-dimensional vector containing the random effects, and $\boldsymbol{\varepsilon}_i$ is an n_i-dimensional vector of residual components. $\boldsymbol{D}$ is a $(q \times q)$ covariance matrix and $\boldsymbol{R}_i$ is a $(n_i \times n_i)$ covariance matrix.

In this study, fixed effects included in the LMM were:

- Main effects: grade, school, ethnicity, IEP, free/reduced lunch, gender (gender is included as a control variable);
- Two-way interaction effects: grade X school, grade X ethnicity, grade X IEP, grade X free/reduced lunch, school X ethnicity, school X IEP, school X free/reduced lunch;
- Three-way interaction effect: school X grade X ethnicity, school X grade X IEP, school X grade X free/reduced lunch.

No random effects were constructed. The compound symmetry (CS) covariance structure was used to model the dependence between observations from subject *i*. The F test based on the type III estimable functions for each effect is used to test if the effect of a term might be statistically significant, under the assumption that the sampled populations are normally distributed. In general, the null and alternative hypotheses for testing each effect are:

H_0: There were no differences between population means at each level of the factor of interest.

H_a: There were differences between population means at some level of the factor of interest.

In general, without further specification, a p-value less than 0.05 indicates that the effect is statistically significant. If the effect of a factor with more than two levels is significant, pairwise comparison was performed to see which two levels are statistically significantly different. To control for the family wise error rate, the Bonferroni procedure is implemented.

Estimated marginal means and the associated standard error (SE) for each factor were reported. Estimated marginal mean of a factor is the mean response of the factor after adjusting for any other variables in the model. An alpha level of .05 was used as the level of significance on all tests to determine whether student achievement differences exist in treatment and/or comparison groups by regular education or special education, free/reduced lunch, or minority student status.

The researcher was trying to answer the following questions: Does the co-teaching model(s) of instruction make a significant difference in the achievement of regular education and special education students' scores on the standardized MAP CA assessment in middle school (grades 6-7) compared to the traditional model? Does the co-teaching model(s) of instruction make a significant difference in the achievement of free/reduced lunch students' scores on the standardized MAP CA assessment in middle school (grades 6-7) compared to the traditional model? Does the co-teaching model(s) of instruction make a significant difference in the achievement of minority students' scores on the standardized MAP CA assessment in middle school (grades 6-7) compared to the traditional model? Needed to run the test were the following: the categorical independent variable (group 1, 2, 3), one continuous dependent variable (posttest MAP scores), one or more continuous covariates (pretest MAP scores). The data analysis showed if the mean MAP CA scores posttest for the three groups were significantly different after the initial pre-test scores are controlled. Special education students who take the MAP A Communication Arts assessment were not included in the study. These students received either an additional resource class, or pull out intervention services in addition to the co-taught instruction.

Students who were not attending all three years at the schools of study were also excluded from the data analysis. Finally, any extreme outliers which caused the data set to not meet assumptions were excluded.

Procedures

Once IRB approval had been obtained, the researcher discussed with both buildings' administrators the co-teaching that had been going on in their buildings. The researcher obtained feedback about which teachers had been implementing the co-teaching with fidelity at each grade level. The researcher set the level of implementation in the classroom at 90 percent. Therefore, according to administrators, the teachers in the proposed study are in a co-taught setting a minimum of 90% of the time. The teachers had to be using the co-teaching methods of instruction that were taught during the professional development, and needed to be meeting the expectations of the district consistently. The administrators shared documentation of the course maps and district common assessments for the traditional and co-taught classrooms, and the researcher made sure that they aligned. The administrators reviewed their evaluations of the teachers in this study to ensure that they were meeting the district expectations for instruction. Only those teachers who fulfilled these requirements were included in the study. Requirements being that they were in a co-taught setting 90% of the time, and were meeting all building and district-wide expectations according to their evaluations by administrators.

Next, the researcher approached both middle schools' building information specialists (BIS) to retrieve the archived 2009-2012 MAP students' 5^{th} -7^{th} grade

Communication Arts scores. Next, the BIS identified students by unique i.d. those who participated in the co-taught content area and special education classes for their sixth and seventh grade years. The researcher also obtained the student MAP Communication Arts scores for their 5th grade year to use as the pretest for all of the groups. The researcher also obtained unique identifiers for special education students from both schools.

The researcher selected two years of data to be used for the study because a longitudinal study holds more weight if the results are maintained over a multiple year span than a single year study. Also, the first year of the proposed study MSA communication arts teachers were both new to the district, and the year before the teachers were not co-teaching due to disagreement. This is why the years of 2009-2012 were selected as the years of study.

After the information had been gathered, the researcher uploaded and organized the information into the SPSS data analysis program. The information was uploaded according to the groups that were analyzed. The researcher used assigned unique identifying numbers to follow students through their three years, instead of names. The first group is Middle School A (MSA), which uses a co-taught with two content area teachers method of instruction; the researcher put in the students 5th grade scores, then the 6th and 7th grade scores. Next, the researcher uploaded group b, both schools regular and special education students' scores for 5th through 7th grade, who participated in the co-taught classroom with the content teacher and special educator together. Their scores were pulled separately because in 5th grade (the elementary setting) they received pull out additional instruction (a traditional

method), but when they transition to the middle school, they are put into the co-taught classroom with a content teacher and special education teacher. The last scores uploaded were Middle School B, group c, which used a traditional model of instruction; the researcher put in the students' 5th grade scores, then the 6th and 7th grade scores. For all three groups, the fifth grade scores were used as the pretest scores and the sixth and seventh grade scores are the posttests. Students who were not in the school district for 5th grade were not included in the study, nor were those who were not in the same school for both 6th and 7th grade, any lost to attrition for any reason were not included.

Once the scores were entered and organized, the researcher checked to make sure that all test assumptions are applicable. The measurements on a subject should be a sample from a multivariate normal distribution. In other words, the residuals (error terms) of linear mixed-effects models (LMM) are assumed to follow a multivariate normal distribution. *Chi-square Q-Q (quantile-quantile) plots* were used to assess multivariate normality. The chi-square Q-Q plot is constructed based on the Mahalanobis distances for the sample. For multivariate data, we plot the ordered Mahalanobis distances versus estimated quantiles (percentiles) for a sample of size *n (n=792 in this study)* from a chi-squared distribution with *p* degrees of freedom (p =# of measures, p = 3). When the points lie very nearly along a straight line, the normality assumption remains tenable. If the assumption is violated, then further action (such as data transformation, deleting outliers, fitting other possible models (generalized linear mixed models, etc.)) is needed.

Chapter Four

Findings and Interpretations

Introduction

This study examined the Communication Arts achievement of students in a co-taught with two content teachers' classroom environment and the effectiveness of this model on standardized assessments as measured by the MAP CA yearly assessments. The researcher felt that a study of the scores for students in the co-taught settings compared to those in a traditional setting may encourage educators to implement this strategy in their content area classrooms because of the growth seen over a three year period for the students participating in the study. In order to research the effectiveness of this instructional model on standardized achievement, the researcher focused on three main questions to analyze the data: (a) Does the co-teaching model(s) of instruction make a significant difference in the achievement of regular education and special education students' scores on the standardized MAP CA assessment in Middle School grades (6-7) compared to the traditional model? (b) Does the co-teaching model(s) of instruction make a significant difference in the achievement of free/reduced lunch students' scores on the standardized MAP CA assessment in Middle School (grades 6-7) compared to the traditional model? (c) Does the co-teaching model(s) of instruction make a significant difference in the achievement of minority (non-Caucasian) students' scores on the standardized MAP CA assessment in a Midwestern Middle School (grades 6-7) compared to the traditional model?

This chapter starts with a description of the establishment and practices of the two co-taught (with two content teachers and special education teacher pushed in for classes with identified special education students) Communication Arts classrooms at Middle School A. A brief explanation of the traditional classroom model which was implemented at Middle School B will also be included. Following this information will be an analysis of the quantitative data showing the student scores from both of the middle schools over a three-year period. The student data will be disseminated into education status (special education or regular education), free/reduced lunch status (yes/no), and ethnicity (Caucasian, African-American, Asian, Hispanic, Native American). After each point of data analysis, explanations will be given to respond to each of the major questions in the study. Several conclusions about this new application of the co-teaching methodology have emerged from this study.

The Background of the Establishment of Middle School A's Co-Taught Communication Arts Classrooms

As the 2007-2008 school year was approaching the two communication arts teachers at Middle School A analyzed their student data from the previous year's MAP CA test, looked ahead to their incoming students' strengths and weaknesses on the assessment, and brainstormed a way to meet the diverse needs of those students who would be joining their classroom in the fall. Their idea was open the wall to begin co-teaching together and combine their students. By combining the classroom space and teacher instructional demands, the teachers felt that this would give them

additional time to reteach/enrich/differentiate their instruction based on the students' level of performance.

The two teachers thought that this may be a viable option and set out to research best-practice methodology in co-teaching instruction. Once the research was completed independently, the teachers came together to discuss the pros/cons of the model and decide if this was a "fit" for their situation. They agreed that this was the best option to meet the diverse academic levels of achievement with their students, so they approached their administrator to discuss the concept with him. The administrator took his time validating their research and he too concluded that this was a positive solution that would allow the teachers the ability to flex their students into groups as needed for each concept of the course map.

With the administrator seal of approval, the teachers moved forward and began to develop a framework of how the model would be implemented for the beginning of the school year. The district had the foresight to include in the layout of the building movable walls which would allow for flexible groupings of the students between the two classrooms. The teachers created the layout of the room to be as conducive to the co-teaching model of instruction as possible. So, the teachers both placed their desks in the front outside corner of the combined classroom space to not interfere with the lessons being instructed from the front and middle area of the combined space. They opened the wall and had the Smart Boards placed in the center of the front of each room, so students could easily view from any area of the classroom. By placing their desks to the outsides of the Smart Boards the teachers

felt that this still allowed them some ownership and separation to the large classroom space.

Luckily, the school district had invested substantial monies into improving technology in each of the schools in the district. Since both classes had the Smart Boards and were situated near each other in the front of the room, it was essential to get the boards wired together. By tying the boards together it allowed for one board to "talk" to the other board. Therefore, whatever is being shown or drawn on one board will automatically be on the second board as well. Because the classroom space was much larger and there would be double the students, the teachers found it necessary to invest and install in an amplification system. This system allowed the teacher who was instructing to wear a microphone and easily be heard over all the students without straining her voice. The student desks were situated to allow everyone ample walking space while being able to view one or both of the boards. The desks were arranged in rows or pods depending on the method of instruction for the day. If there was a direct instruction lesson the desks were in rows because students would be taking notes and working independently on applied practice. If the lesson was cooperative learning or small group instruction for differentiation, the desks were arranged in pods. This allowed for the teacher to either come around and work with each group of students based on their area of weakness, or group the students so that a student who was excelling could model and aid another in the group who was struggling.

The teachers began their instruction together and really enjoyed working so closely with one another. They felt that they were better able to differentiate their

lessons and meet the needs of all their students through this scaffolded structure of instruction. At the end of the year they reflected on their practices, weaknesses, and strengths from the year. They were able to revise some things to make them more effective, and their student scores had grown, so they felt successful in what they had accomplished.

Due to the success of the 6th grade co-taught classroom, the communication arts department chair felt that the 7th grade communication arts teachers should implement this instructional method as well. So, the next year the 6th and 7th grade teachers all used the co-taught instructional method with the walls open in their classrooms for differentiation. Unfortunately, the 2007-2008 school year did not go as well for the 7th grade teachers as it had for the 6th grade teachers the previous year. After one semester of co-taught instruction, the two 7th grade teachers decided to shut the wall again due to differences in classroom management and instructional grading practices. At the end of the year, one of the 7th grade teachers retired, and the other decided that a change of profession may better suit her needs, so there were no 7th grade communication arts teachers for the 2010-2011 school year.

The department chair and administrators still felt that co-teaching in the communication arts classrooms was the best method of instruction to meet the needs of the students. Therefore, when they did interviews for the open positions, they were sure to include questions about experience co-teaching, if the candidate would be open to co-teaching with two content teachers, and classroom management styles to make sure that the candidates hired were compatible and could teach with the wall open. So, the 2010-2011 school year started with two new teachers who were ready

and excited to co-teach with the wall open and work through any difficulties which may arise without just quitting and closing the wall. The co-taught 6th and 7th grade students from the 2010-2012 Middle School A are the scores that were pulled for the analysis in this study to determine the effectiveness of this instructional method.

In contrast, Middle School B's 6th and 7th grade teachers used a traditional model of instruction with their students during the 2010-2012 school. A traditional model of instruction meant that there were two 6th grade teachers and two 7th grade teachers, each with their own separate classrooms and they used strategies to meet the needs of their students without sharing the space/instruction with another teacher. Their walls did not have the ability to move, so a shared space was not an option for them. They could however, differentiate instruction for their students by pulling students independently, working with them in small group, or asking them to stay before/after school for additional instruction. However, for 5th grade, all students received the same instruction at Middle School A and B, which was the traditional model.

Participants

Data from 1195 students were obtained. Among them, 803 had complete data for all three grades. If a student was not in the same middle school for the 5th grade year, 6th grade year, and 7th grade year, then his/her data were excluded. Four students were excluded due to change of schools. This leads to a total number of 799 students. Among the 799 students, 5 had inconsistent answers for ethnicity for the three grade years, and 1 subject with the same full name appeared twice, and hence

these 8 subjects (two subjects with the same full name) were excluded. Therefore, a total number of 792 students were included in the data analyses for this project. Among the 792 subjects, 392 (49.5%) were from MSB and 400 (50.5%) were from MSA. 375 (47.3%) were females and 417 (52.7%) were males. The distribution of the ethnicity is: 1 American Indian (0.1%), 23 Asian (2.9%), 53 Black (6.7%), 22 Hispanic (2.8%), and 693 White (87.5%).

Variables

There was one dependent variable used in this study and that was the 5^{th}, 6^{th}, and 7^{th} grade MAP CA scores for the 792 students included in the study. The independent variables in this study were the grade level, middle school, gender, ethnicity, IEP (special education status), and Free/reduced lunch status.

Linear mixed-effects models (LMM)

The measurements on a subject should be a sample from a multivariate normal distribution. In other words, the residuals (error terms) of LMM are assumed to follow a multivariate normal distribution. *Chi-square Q-Q (quantile-quantile) plots* were used to assess multivariate normality (Johnson, R. and Wichern, D., 1992). The chi-square Q-Q plot is constructed based on the Mahalanobis distances for the sample. For multivariate data, we plot the ordered Mahalanobis distances versus estimated quantiles (percentiles) for a sample of size *n (n=792 in this study)* from a chi-squared distribution with *p* degrees of freedom (p =# of measures, p = 3). When the points lie very nearly along a straight line, the normality assumption remains

tenable. If the assumption is violated, then further action (such as data transformation, deleting outliers, fitting other possible models (generalized linear mixed models, etc.)) is needed.

An LMM described above using all data from the 792 subjects were fit. Before discussing the results, the normality assumption was checked using the model residuals. The Chi-square QQ plot shown in Figure 1 indicates that the normality assumption is violated. 8 outliers (upper right corner) may have caused the violation of the normality assumption.

Table 7: One way frequency table of IEP and free/reduced lunch at each grade. Numbers in parentheses are percentages.

Variable		Grade 5	Grade 6	Grade 7
IEP	No	702(88.6)	720(90.9)	727(91.8)
	Yes	90(11.4)	72(9.1)	65(8.2)
Free/reduced lunch	No	655(82.7)	646(81.6)	642(81.1)
	Yes	137(17.3)	146(18.4)	150(18.9)

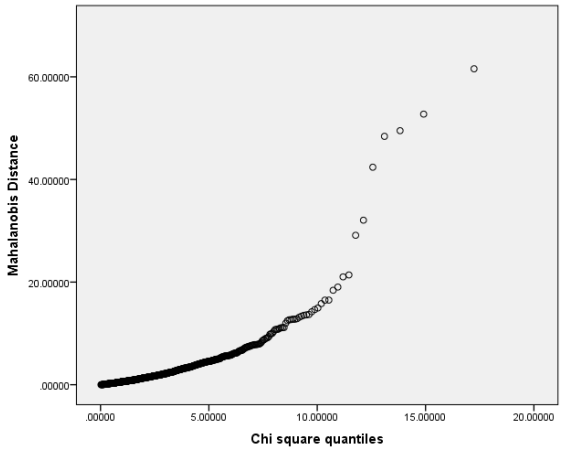

Figure 1: Chi-square QQ plot

Data analysis after excluding data for the 8 outliers

In this section, the 8 outliers (subjects) were first excluded. The outliers at the right were excluded because they are truly outside of the "fit" line. No outliers were identified at the lower range of student scores. The data is skewed to the left, meaning that it is negatively skewed and all outliers were from the positive side (right side) of the data. Because of the 8 outliers, the number of subjects included in the following analysis is 784. Among the 784 subjects, 389 (49.6%) were from Middle School A (MSA) and 495 (50.4%) were from Middle School B (MSB). 371 (47.3%) were females and 413 (52.7%) were males. The distribution of the ethnicity is: 1 American Indian (0.1%), 23 Asian (2.9%), 53 Black (6.8%), 22 Hispanic (2.8%), and 685 White (87.4%). Table 8 shows the percentage and frequency counts of IEP and free/reduced lunch at each grade.

Table 8: One way frequency table of IEP and free/reduced lunch at each grade. Numbers in parentheses are percentages.

Variable		Grade 5	Grade 6	Grade 7
IEP	No	698(89.0)	716(91.3)	723(92.2)
	Yes	86(11.0)	68(8.7)	61(7.8)
Free/reduced lunch	No	650(82.9)	641(81.8)	637(81.3)
	Yes	134(17.1)	143(18.2)	147(18.8)

An LMM described in this section using all data from the 784 subjects were fit. Before discussing the results, the normality assumption was checked using the model residuals. The Chi-square QQ plot shown in Figure 2 indicates that the normality assumption is satisfied as most of the points lie on the straight line.

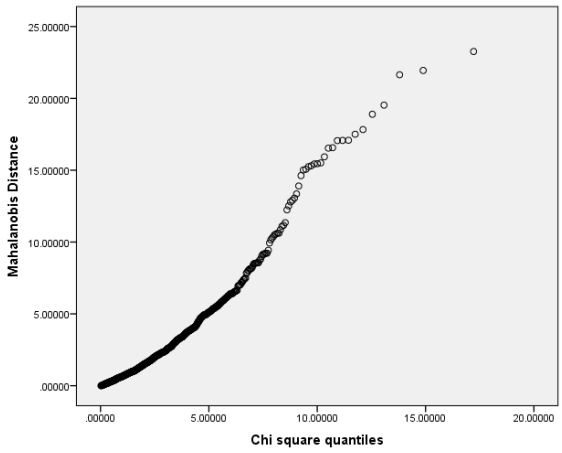

Figure 2: Chi-square QQ plot

The results of the F-test from the LMM are summarized in Table 9.

Table 9: Results of F-test.
* indicates significant at the 0.05 level.

Variable	Numerator df	Denominator df	F	p
school	1	857.35	0.11	0.75
Grade	2	1500.69	0.22	0.81
Gender	1	735.64	11.35	0.001*
IEP	1	2097.34	79.55	<0.0001*
Free/Reduced Lunch	1	2259.17	15.93	<0.0001*
Ethnicity	4	740.61	6.37	<0.0001*
school X Grade	2	1510.21	3.81	0.02*
Grade X IEP	2	1543.16	4.39	0.01*
Grade X Ethnicity	8	1498.37	0.49	0.86
Grade X Free/reduced Lunch	2	1523.99	0.82	0.44
school X IEP	1	2091.69	0.02	0.89
school X Ethnicity	3	744.24	0.84	0.48
school X Free/Reduced Lunch	1	2258.90	0.04	0.85
school X Grade X IEP	2	1543.09	2.80	0.06
school X Grade X Ethnicity	6	1499.17	0.88	0.51
school X Grade X Free/reduced Lunch	2	1523.98	0.21	0.81

The illustration should start from the highest order interaction effects. The results of the three-way interaction effects are as follows. The School x Grade x Free/Reduced Lunch effect was not statistically significant ($F(2, 1524) = 0.212$, $p =$

0.809). This indicates that the influence of Free/reduced lunch on MAP CA scale score did not depend on the level of School x Grade. This is, the pattern of differences between mean MAP CA scale scores for Free/reduced lunch (yes, no) did not change at each level of School x Grade. Table 10 shows the estimated marginal means MAP CA scale scores for Free/reduced lunch (yes, no) at each level of School x Grade. Figure 3 is the interaction plot of the estimated marginal means MAP CA scale scores for Free/reduced lunch (yes = 1, no = 0) at each level of School x Grade.

Table 10: The estimated marginal means MAP CA scale scores for Free/reduced lunch (yes, no) at each level of School x Grade.
SE: standard error.

Middle School	Grade	Free/Reduced Lunch	Mean	SE	95% Confidence Interval	
					Lower Bound	Upper Bound
MSA	5	N	673.17	6.38	660.64	685.69
		Y	666.83	6.67	653.75	679.92
	6	N	674.31	6.44	661.68	686.94
		Y	668.38	6.67	655.29	681.47
	7	N	677.76	6.44	665.13	690.39
		Y	668.76	6.64	655.73	681.79
MSB	5	N	672.64	4.27	664.27	681.00
		Y	667.61	4.51	658.78	676.45
	6	N	666.90	4.33	658.41	675.38
		Y	660.10	4.59	651.11	669.10
	7	N	667.50	4.45	658.77	676.23
		Y	660.01	4.62	650.97	669.07

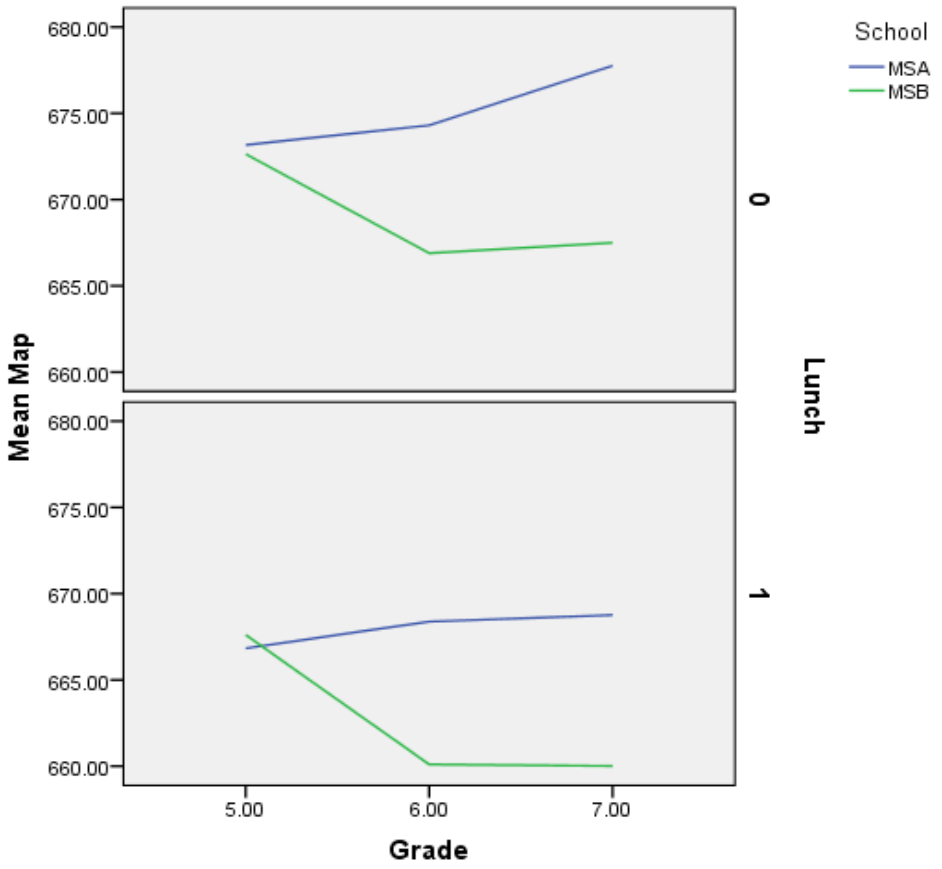

Figure 3: Interaction plot of the estimated marginal means MAP CA scale scores for Free/reduced lunch (yes = 1, no = 0) at each level of School x Grade

The School x Grade x Ethnicity effect was not statistically significant ($F(6, 1499) = 0.878$, $p = 0.510$). This indicates that the influence of Ethnicity on MAP CA scale score did not depend on the level of School x Grade. This is, the pattern of differences between mean MAP CA scale scores for Ethnicity (White, Asian, Black, Hispanic, American Indian) did not change at each level of School x Grade. Table 11 shows the estimated marginal means MAP CA scale scores for Ethnicity at each level of School x Grade. As the effect was not significant, the interaction plots are not shown.

Table 11: The estimated marginal means MAP scale scores for Ethnicity at each level of School X Grade.
SE: standard error. NA: not available.

Middle School	GR	Race/ Ethnicity	Mean	SE	95% Confidence Interval	
					Lower Bound	Upper Bound
MSA	5	American Indian	687.17	28.27	631.71	742.64
		Asian	681.91	7.61	666.99	696.84
		Black	652.12	4.66	642.99	661.26
		Hispanic	657.76	8.07	641.94	673.60
		White	671.02	2.35	666.41	675.64
	6	American Indian	694.63	28.28	639.15	750.13
		Asian	681.85	7.55	667.05	696.67
		Black	650.86	4.69	641.66	660.07
		Hispanic	657.98	8.11	642.08	673.90
		White	671.37	2.48	666.52	676.23
	7	American Indian	682.84	28.28	627.35	738.33
		Asian	685.77	7.55	670.96	700.59
		Black	651.84	4.66	642.69	660.98
		Hispanic	671.54	8.12	655.60	687.48
		White	674.31	2.50	669.41	679.20
MSB	5	American Indian	NA	NA	NA	NA
		Asian	690.14	10.05	670.42	709.86
		Black	662.75	7.81	647.42	678.08
		Hispanic	651.64	9.55	632.89	670.38
		White	675.97	2.27	671.51	680.43
	6	American Indian	NA	NA	NA	NA
		Asian	674.40	10.10	654.58	694.23
		Black	660.08	7.81	644.75	675.41
		Hispanic	650.65	9.62	631.78	669.52
		White	668.86	2.49	663.97	673.76
	7	American Indian	NA	NA	NA	NA
		Asian	677.61	10.10	657.79	697.42
		Black	658.79	7.86	643.37	674.21
		Hispanic	647.25	9.65	628.32	666.18
		White	671.37	2.59	666.28	676.45

The School x Grade x IEP effect was not statistically significant ($F(2, 1543) = 2.798$, $p = 0.061$). This indicates that the influence of IEP on MAP CA scale score did not depend on the level of School x Grade. This is, the pattern of differences between mean MAP CA scale scores for IEP (yes, no) did not change at each level of

School x Grade. Table 12 shows the estimated marginal means MAP CA scale scores for IEP at each level of School x Grade. As the effect was not significant, the interaction plots are not shown.

Table 12: The estimated marginal means MAP scale scores for IEP at each level of School X Grade.
SE: standard error.

Middle School	Grade	IEP	Mean	SE	95% Confidence Interval	
					Lower Bound	Upper Bound
MSA	5	N	681.56	6.15	669.50	693.62
		Y	658.44	7.09	644.54	672.35
	6	N	679.64	6.15	667.58	691.70
		Y	663.05	7.24	648.84	677.26
	7	N	685.81	6.14	673.77	697.86
		Y	660.70	7.25	646.48	674.93
MSB	5	N	677.80	4.02	669.91	685.69
		Y	662.45	4.89	652.86	672.04
	6	N	673.73	4.04	665.80	681.66
		Y	653.27	5.26	642.96	663.58
	7	N	677.23	4.01	669.36	685.11
		Y	650.28	5.52	639.45	661.10

As none of the three-way interaction effects were significant, the next step is to investigate the two-way interaction effects. The school x Free/Reduced Lunch effect was not statistically significant ($F(1, 2259) = 0.037$, $p = 0.847$). This indicates that the influence of Free/reduced lunch on MAP CA scale score did not depend on the type of School. This is, the pattern of differences between mean MAP CA scale scores for Free/reduced lunch (yes, no) did not change at each level of School (MSA, MSB). Table 13 shows the estimated marginal means MAP CA scale scores for Free/reduced lunch (yes, no) at each level of School. As the effect was not significant, the interaction plots are not shown.

Table 13: The estimated marginal means MAP scale scores for Free/reduced lunch at each School.
SE: standard error.

Middle School	Free/Reduced Lunch	Mean	SE	95% Confidence Interval	
				Lower Bound	Upper Bound
MSA	N	675.08	5.79	663.72	686.44
	Y	667.99	5.98	656.26	679.73
MSB	N	669.01	3.87	661.41	676.61
	Y	662.58	4.05	654.63	670.52

The school x Ethnicity effect was not statistically significant ($F(3, 744) = 0.835$, $p = 0.475$). This indicates that the influence of Ethnicity on MAP CA scale score did not depend on the type of School. This is, the pattern of differences between mean MAP CA scale scores for Ethnicity did not change at each level of School. Table 14 shows the estimated marginal means MAP CA scale scores for Ethnicity at each level of School. As the effect was not significant, the interaction plots are not shown.

Table 14: the estimated marginal means MAP scale scores for Ethnicity at each School.
SE: standard error. NA: not available.

Middle School	Race/Ethnicity	Mean	SE	95% Confidence Interval	
				Lower Bound	Upper Bound
MSA	American Indian	688.22	25.65	637.87	738.57
	Asian	683.18	6.84	669.77	696.60
	Black	651.61	4.21	643.34	659.88
	Hispanic	662.43	7.32	648.06	676.81
	White	672.24	2.14	668.04	676.43
	Minority	671.36	11.01	649.79	692.97
MSB	American Indian	NA	NA	NA	NA
	Asian	680.72	9.13	662.79	698.64
	Black	660.54	7.10	646.61	674.47
	Hispanic	649.85	8.68	632.80	666.89
	White	672.07	2.10	667.95	676.18
	Minority	663.70	8.30	647.40	680.00

The School x IEP effect was not statistically significant ($F(1, 2092) = 0.021$, $p = 0.886$). This indicates that the influence of IEP on MAP CA scale score did not depend on the type of School. This is, the pattern of differences between mean MAP CA scale scores for IEP did not change at each level of School. Table 15 shows the estimated marginal means MAP CA scale scores for IEP at each level of School. As the effect was not significant, the interaction plots are not shown.

Table 15: The estimated marginal means MAP scale scores for IEP at each School.
SE: standard error.

Middle School	IEP	Mean	SE	95% Confidence Interval	
				Lower Bound	Upper Bound
MSA	N	682.34	5.57	671.41	693.27
	Y	660.73	6.42	648.14	673.33
MSB	N	676.25	3.64	669.11	683.40
	Y	655.33	4.56	646.39	664.27

The Grade x Free/Reduced Lunch effect was not statistically significant ($F(2, 1524) = 0.817$, $p = 0.442$). This indicates that the influence of Free/reduced lunch on MAP CA scale score did not depend on the level of Grade. This is, the pattern of differences between mean MAP CA scale scores for Free/reduced lunch (yes, no) did not change at each level of Grade. Table 16 shows the estimated marginal means MAP CA scale scores for Free/reduced lunch (yes, no) at each level of Grade. As the effect was not significant, the interaction plots are not shown.

Table 16: The estimated marginal means MAP CA scale scores for Free/reduced lunch at each Grade.
SE: standard error.

Grade	F/R Lunch	Mean	SE	95% Confidence Interval	
				Lower Bound	Upper Bound
5	N	672.93	4.02	665.04	680.82
	Y	667.18	4.21	658.91	675.45
6	N	671.01	4.06	663.05	678.98
	Y	664.70	4.23	656.40	673.00
7	N	673.20	4.09	665.18	681.22
	Y	664.87	4.22	656.59	673.16

The Grade x Ethnicity effect was not statistically significant ($F(8, 1498) = 0.495$, $p = 0.860$). This indicates that the influence of Ethnicity on MAP CA scale score did not depend on the level of Grade. This is, the pattern of differences between mean MAP CA scale scores for Ethnicity did not change at each level of Grade. Table 17 shows the estimated marginal means MAP CA scale scores for Ethnicity at each level of Grade. As the effect was not significant, the interaction plots are not shown.

Table 17: the estimated marginal means MAP scale scores for Ethnicity at each Grade. SE: standard error.

Grade	Race/Ethnicity	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
5	American Indian	687.17	28.27	631.70	742.64
	Asian	686.03	6.31	673.66	698.40
	Black	657.44	4.55	648.51	666.36
	Hispanic	654.70	6.26	642.42	666.99
	White	673.50	1.64	670.29	676.71
	Minority	671.34	11.35	649.07	693.60
6	American Indian	694.64	28.28	639.15	750.13
	Asian	678.13	6.31	665.75	690.51
	Black	655.47	4.56	646.54	664.41
	Hispanic	654.32	6.30	641.96	666.68
	White	670.12	1.76	666.67	673.57
	Minority	670.64	11.36	648.35	692.93
7	American Indian	682.84	28.28	627.35	738.33
	Asian	681.69	6.31	669.31	694.07
	Black	655.31	4.57	646.35	664.28
	Hispanic	659.40	6.32	647.01	671.79
	White	672.84	1.80	669.30	676.37
	Minority	669.81	11.37	647.51	692.12

The Grade x IEP effect was statistically significant ($F(2, 1543) = 4.392$, $p = 0.013$). This indicates that the influence of IEP on MAP CA scale score depended on the level of Grade. This is, the pattern of differences between mean MAP CA scale scores for IEP changed at some levels of Grade. Table 18 shows the estimated marginal means MAP CA scale scores for IEP at each level of Grade. The results of pairwise comparisons indicate that at each Grade, the differences between mean MAP CA scale scores for IEP were all significant ($p < 0.0001$). Figure 4 shows the interaction plot of the estimated marginal means MAP CA scale scores for IEP at each level of Grade.

Table 18: the estimated marginal means MAP scale scores for IEP at each Grade.
SE: standard error.

Grade	IEP	Mean	SE	95% Confidence Interval	
				Lower Bound	Upper Bound
5	N	679.89	3.86	672.32	687.45
	Y	660.22	4.50	651.40	669.05
6	N	677.01	3.86	669.44	684.59
	Y	658.70	4.66	649.57	667.83
7	N	682.00	3.85	674.45	689.55
	Y	656.07	4.72	646.81	665.33

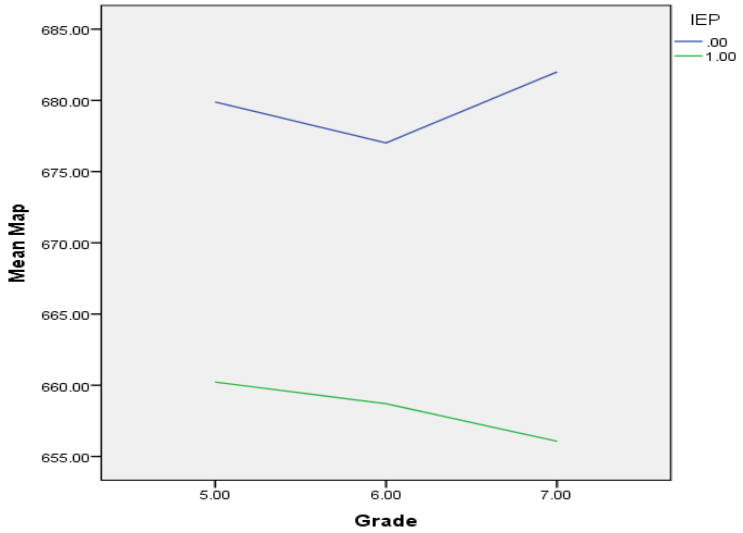

Figure 4: The interaction plot of the estimated marginal means MAP scale scores for IEP at each level of Grade.

The School x Grade effect was statistically significant ($F(2, 1510) = 3.0808$, $p = 0.022$). Table 19 shows the estimated marginal means MAP CA scale scores for school at each Grade. Table 20 shows the results of pairwise comparisons of Grade effect at each level of school. It suggests that there was no grade effect on Map CA scale scores when the school is MSA. However, the grade effect was significant on Map CA scale scores when the school is MSB. Specifically, the mean Map CA scale scores were statistically significantly different between 5th grade and 6th grade, and

between 5th grade and 7th grade. Figure 5: the interaction plot of the estimated marginal means MAP scale scores for grade at each school.

Table 21 presents the results of pairwise comparisons of School effect at each level of grade. Figure 6 shows the interaction plot of the estimated marginal means MAP CA scale scores for school at each grade. Though Figure 6 suggests that there might be School effect on MAP CA scale scores at 6th and 7th grades, the results of Table 15 claim that there were no statistically significantly school effects on MAP CA scale scores at 6th and 7th grades. This is, the differences of the mean MAP CA scale scores at 6th and 7th grades between the two schools were not statistically significantly different.

Table 19: The estimated marginal means MAP scale scores for school at each Grade. SE: standard error.

Middle School	Grade	Mean	SE	95% Confidence Interval	
				Lower Bound	Upper Bound
MSA	5	670.00	6.36	657.52	682.48
	6	671.35	6.38	658.82	683.87
	7	673.26	6.38	660.74	685.78
MSB	5	670.12	4.13	662.02	678.23
	6	663.50	4.21	655.23	671.77
	7	663.75	4.30	655.32	672.19

Table 20: Results of pairwise comparisons of Grade effect at each level of school.
*: The mean difference is significant at the .05 level.

Middle School	(I) Grade	(J) Grade	Mean Difference (I-J)	SE	p	95% Confidence Interval for Difference[e]	
						Lower Bound	Upper Bound
MSA	5	6	-1.34	4.75	0.78	-10.66	7.97
		7	-3.26	4.75	0.49	-12.58	6.06
	6	5	1.34	4.75	0.78	-7.97	10.66
		7	-1.91	4.74	0.69	-11.22	7.39
	7	5	3.26	4.75	0.49	-6.06	12.58
		6	1.91	4.74	0.69	-7.39	11.22
MSB	5	6	6.63	3.16	0.036*	0.43	12.82
		7	6.37	3.24	0.049*	0.02	12.73
	6	5	-6.63	3.16	0.036*	-12.82	-0.43
		7	-0.26	3.25	0.94	-6.63	6.12
	7	5	-6.37	3.24	0.049*	-12.73	-0.02
		6	0.25	3.25	0.94	-6.12	6.63

Table 21: results of pairwise comparisons of School effect at each level of grade.

Grade	(a) Middle School	(b) Middle School	Mean Difference (a-b)	SE	p	95% Confidence Interval for Difference[d]	
						Lower Bound	Upper Bound
5	MSA	MSB	-0.12	7.58	0.99	-15.00	14.75
	MSB	MSA	0.12	7.58	0.99	-14.75	15.00
6	MSA	MSB	7.85	7.65	0.31	-7.16	22.85
	MSB	MSA	-7.85	7.65	0.31	-22.85	7.16
7	MSA	MSB	9.51	7.69	0.22	-5.58	24.60
	MSB	MSA	-9.51	7.69	0.22	-24.60	5.58

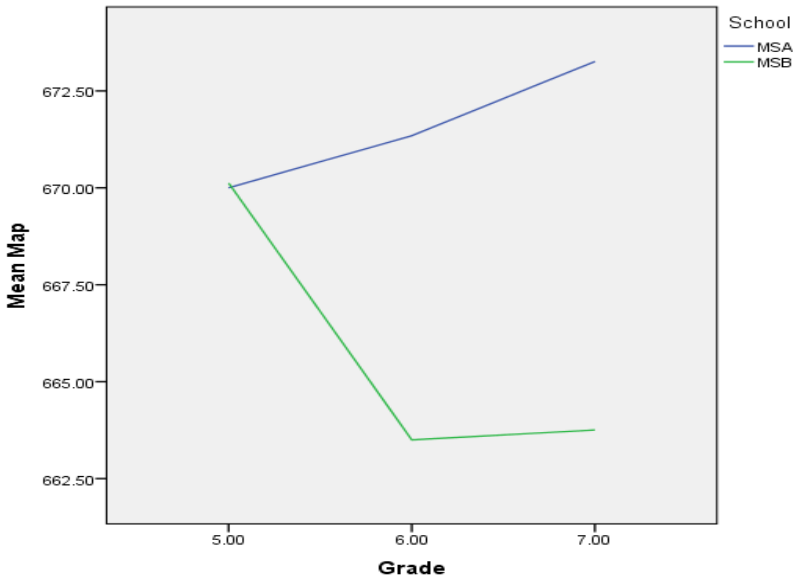

Figure 5: The interaction plot of the estimated marginal means MAP scale scores for grade at each school.

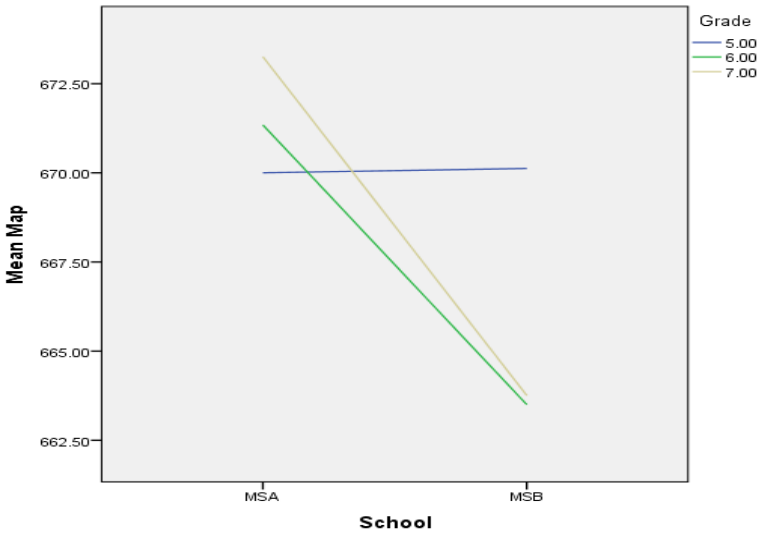

Figure 6: the interaction plot of the estimated marginal means MAP scale scores for school at each grade.

Only the test results of the main effects of Free/reduced lunch and ethnicity are interpreted as the two-way interaction effects for these two factors were not significant. If the interaction effect is significant, then it is not meaningful and may be misleading to interpret the main effects. The Free/reduced lunch effect was statistically significant ($F(1, 2259) = 15.933$, $p < 0.0001$). This indicates that the influence of Free/Reduced Lunch on the overall MAP CA scale scores was significant. Table 22 shows the estimated marginal means MAP CA scale scores for Free/reduced Lunch.

Table 22: The estimated marginal means MAP scale scores for school at each level of free/reduced lunch.
SE: standard error.

Free/reduced Lunch	Mean	SE	95% Confidence Interval	
			Lower Bound	Upper Bound
N	672.38	3.65	665.22	679.54
Y	665.59	3.78	658.17	673.00

The Ethnicity effect was statistically significant ($F(4, 741) = 6.368$, $p < 0.0001$). This indicates that the influence of ethnicity on the overall MAP CA scale scores was significant. Table 23 shows the estimated marginal means MAP CA scale scores for Ethnicity. Table 24 shows the results of pairwise comparisons of mean differences of MAP CA scale score for ethnicity. The results suggest that among the 5 ethnicity, the mean differences of MAP CA scale scores between Black and White, between Black and Asian, between Asian and Hispanic, and between White and Hispanic were all statistically significant.

Table 23: The estimated marginal means MAP scale scores for school at each level of ethnicity.
SE: standard error.

Race/Ethnicity	Mean	SE	95% Confidence Interval	
			Lower Bound	Upper Bound
American Indian	688.22	25.65	637.87	738.57
Asian	681.95	5.71	670.75	693.15
Black	656.07	4.13	647.97	664.17
Hispanic	656.14	5.69	644.97	667.31
White	672.15	1.50	669.21	675.09
Minority	670.60	10.30	651.14	690.80

Table 24: results of pairwise comparisons of mean differences of MAP scale score for ethnicity.
*: The mean difference is significant at the .05 level.

(I) Race/Ethnicity	(J) Race/Ethnicity	Mean Difference (I-J)	Std. Error	df	p	95% Confidence Interval for Difference[e]	
						Lower Bound	Upper Bound
American Indian	Asian	6.27	26.22	731.34	1.00	-67.55	80.08
	Black	32.14	25.94	732.02	1.00	-40.90	105.18
	Hispanic	32.08	26.24	732.83	1.00	-41.79	105.95
	White	16.07	25.63	731.98	1.00	-56.11	88.24
Asian	American Indian	-6.27	26.22	731.34	1.00	-80.08	67.55
	Black	25.88	6.96	738.02	0.002*	6.28	45.47
	Hispanic	25.81	7.90	735.20	0.011*	3.56	48.06
	White	9.80	5.69	731.47	0.85	-6.21	25.81
Black	American Indian	-32.14	25.94	732.02	1.00	-105.18	40.90
	Asian	-25.88	6.96	738.02	0.002*	-45.47	-6.28
	Hispanic	-.07	6.93	740.02	1.00	-19.58	19.45
	White	-16.08	4.27	760.73	0.002*	-28.10	-4.05
Hispanic	American Indian	-32.08	26.24	732.83	1.00	-105.95	41.79
	Asian	-25.81	7.90	735.20	0.011*	-48.06	-3.56
	Black	.07	6.93	740.02	1.00	-19.45	19.58
	White	-16.01	5.68	742.18	0.049*	-32.00	-0.02
White	American Indian	-16.07	25.63	731.98	1.00	-88.24	56.11
	Asian	-9.80	5.69	731.47	0.85	-25.81	6.21
	Black	16.08	4.27	760.73	0.002*	4.05	28.10
	Hispanic	16.01	5.68	742.18	0.049*	0.02	32.00
	Minority	1.56	10.32	741.59	0.48	-27.50	30.61

Summary

In this chapter, the researcher presented the quantitative data for this study to formulate correlations between teaching method (school) and communication arts standardized assessment scores. The researcher broke the data down by subgroup because this was part of both schools' School Improvement Plan to increase student academic achievement on the communication arts standardized assessment. The subgroup data shows that the instructional method does not impact standardized achievement in all cases, as measured by the communication arts assessment. The only subgroup which showed that the co-teaching method of instruction had a statistically significant impact on standardized assessments were School x Grade. MSB, the traditional method of instruction, showed a statistically significant decrease in student achievement scores between grades 5 and 6 and 5 and 7 when compared the co-taught students at MSA. Ethnicity, Free/Reduced Lunch status, and IEP all showed to negatively impact student achievement scores at the statistically significant level at both schools, so teaching method did not affect this.

Chapter V

Conclusions

Introduction

The purpose of this study was to determine if the participants in a co-taught communication arts classroom would perform better on the yearly communication arts standardized assessment as measured by the MAP CA assessment when compared to participants in a traditional setting. The conclusions from this research study focused on the following questions: (a) Does the co-teaching model(s) of instruction make a significant difference in the achievement of regular education and special education students' scores on the standardized MAP CA assessment in Middle School (grades 6-7) compared to a traditional model? (b) Does the co-teaching model(s) of instruction make a significant difference in the achievement of free/reduced lunch students' scores on the standardized MAP CA assessment in Middle School (grades 6-7) compared to a traditional model? (c) Does the co-teaching model(s) of instruction make a significant difference in the achievement of minority (non-Caucasian) students' scores on the standardized MAP CA assessment in Middle School (grades 6-7) compared to a traditional model?

This research project, delved into past studies which focused specifically on qualitative and quantitative outcomes. These studies honed into the co-teaching method between a special education and regular education teacher. Many of the studies had biased quantitative outcomes because the tools used for measurement were not nationally normed assessments, but measures of achievement as determined

by individual teachers or districts. In contrast, this research study expanded on the current body of co-teaching literature by focusing on a classroom utilizing the co-teaching method between two regular education teachers, and two regular education teachers paired with a special education teacher. The current study not only focused on outcomes of the special education students, but included specific outcomes for minorities, free/reduced lunch students, and regular education students. The measurement tool had greater validity and reliability than the tools used in the other studies (quarterly exams, benchmarks, grade achievement). Another way that this study design will enhance the body of knowledge is that it was a longitudinal study, and examined the student scores over multiple year assessments.

The researcher used a quantitative method for this research study, and the design, methods, and data analysis were shared in previous chapters. This chapter will present the conclusions gleaned from the data analysis for each of the subgroups and possible interactions. Following the conclusions for each subgroup and interaction are suggestions for future research opportunities and limitations of this study. The chapter will conclude with final thoughts by the researcher concerning the study and co-teaching between two content area teachers.

Analysis of Question One

The first question in the study was: Does the co-teaching model(s) of instruction make a significant difference in the achievement of regular education and special education students' scores on the standardized MAP CA assessment in Middle School (grades 6-7) compared to a traditional model? The hypothesis states: After

three years in the co-taught setting of Middle School A, regular education and special education students' scores on the standardized MAP CA assessment grades 6 and 7 will increase at a statistically significant rate when compared to students' scores at the non-co-taught setting of Middle School B. The null hypothesis states: After three years in the co-taught setting of Middle School A, regular education and special education students' scores on the standardized MAP CA assessment grades 6 and 7 will not increase at a statistically significant rate when compared to students' scores at the non-co-taught setting of Middle School B.

The first analysis for this question examined the interaction between three of the factors. The School x Grade x IEP effect was not statistically significant ($F(2, 1543) = 2.798$, $p = 0.061$). This indicates that the influence of IEP (special education status) on MAP CA scale score did not depend on the level of School x Grade. This is, the pattern of differences between mean MAP CA scale scores for IEP (yes, no) did not change at each level of School x Grade. Meaning, that it didn't matter if the special education students received the co-taught with two content area teachers or not, the mean scores were not statistically significant between the two teaching methods (Schools). If this were the only data test run, the null hypothesis would have to be accepted. The next test to focus on this question has interaction between two factors. The school x IEP effect was not statistically significant ($F(1, 2092) = 0.021$, $p = 0.886$). This indicates that the influence of IEP on MAP CA scale score did not depend on the type of School. This is, the pattern of differences between mean MAP CA scale scores for IEP did not change at each level of School. The next analysis, School x Grade effect was statistically significant ($F(2, 1510) = 3.0808$, $p = 0.022$).

Table 13 shows the estimated marginal means MAP CA scale scores for school at each Grade (5, 6, 7). Table 19 shows the results of pairwise comparisons of Grade effect at each level of school. It suggests that there was no grade effect on Map CA scale scores when the school is MSA (co-taught with two content teachers). However, the grade effect was significant on Map CA scale scores when the school is MSB (traditional). Specifically, the mean Map CA scale scores were statistically significantly different between 5^{th} grade and 6^{th} grade, and between 5^{th} grade and 7^{th} grade. Table 21 presented the results of pairwise comparisons of School effect at each level of grade. Figure 6 showed the interaction plot of the estimated marginal means MAP CA scale scores for school at each grade. Though Figure 6 suggests that there might be School effect on MAP CA scale scores at 6^{th} and 7^{th} grades, the results of Table 21 claim that there was no statistically significantly school effect on MAP CA scale scores at 6^{th} and 7^{th} grades, once again supporting the null hypothesis. This is, the differences of the mean MAP CA scale scores at 6^{th} and 7^{th} grades between the two schools were not statistically significantly different when looking at all of the student population as a whole and not desegregating by IEP status. All of these tests show that for the first research question the null hypothesis must be accepted. The method of instruction (received from MSA/MSB) did not have a statistically significant impact on regular or special education students' scores as measured by the MAP CA standardized assessments in either grade 6 or 7.

Continuing to examine regular and special education students' scores revealed the following statistically significant data analysis for this subgroup of students. The Grade x IEP effect was statistically significant ($F(2, 1543) = 4.392$, $p = 0.013$). This

indicates that the influence of IEP on MAP CA scale score depended on the level of Grade. This is, the pattern of differences between mean MAP CA scale scores for IEP changed at some levels of Grade. The data showed that at all three grade levels the students who were identified as regular education and not special education mean scores were higher at a statistically significant level at all three grades for both schools. This is common sense for educators. If a student is labeled with an IEP or special education status, he/she has either a learning or behavior impairment which would affect his/her academic abilities and requires modifications to be successful in a regular education setting, or meeting the same academic standards as the non-identified students. This test does not in any way validate the hypothesis, but merely supports the body of knowledge which says that these students function at a lower level on standardized achievement assessments.

Analysis of Question Two

The next question in the study was: Does the co-teaching model(s) of instruction make a significant difference in the achievement of free/reduced lunch students' scores on the standardized MAP CA assessment in Middle School (grades 6-7) compared to a traditional model? The hypothesis states: After three years in the co-taught setting of Middle School A, free/reduced lunch students' scores on the standardized MAP CA assessment grades 6 and 7 will increase at a statistically significant rate when compared to students' scores at the non-co-taught setting of Middle School B. The null hypothesis states: After three years in the co-taught setting of Middle School A, free/reduced lunch students' scores on the standardized

MAP CA assessment grades 6 and 7 will not increase at a statistically significant rate when compared to students' scores at the non-co-taught setting of Middle School B.

For the first data analysis, the researcher looked at the interaction between three variables, the School x Grade x Free/Reduced Lunch effect was not statistically significant ($F(2, 1524) = 0.212$, $p = 0.809$). This indicates that the influence of Free/reduced lunch on MAP CA scale score did not depend on the level of School x Grade. This is, the pattern of differences between mean MAP CA scale scores for Free/reduced lunch (yes, no) did not change at each level of School x Grade. This test supports the null hypothesis that the teaching method does not statistically significantly impact standardized achievement scores for free/reduced lunch students. Also supporting the null was the second test. The School x Free/Reduced Lunch effect was also not statistically significant ($F(1, 2259) = 0.037$, $p = 0.847$). This indicates that the influence of Free/reduced lunch on MAP CA scale score did not depend on the type of School. This is, the pattern of differences between mean MAP CA scale scores for Free/reduced lunch (yes, no) did not change at each level of School. The Grade x Free/Reduced Lunch effect was also not statistically significant ($F(2, 1524) = 0.817$, $p = 0.442$). This indicates that the influence of Free/reduced lunch on MAP CA scale score did not depend on the level of Grade, so by taking the instructional method (school attended) out of the equation, this subgroup of students was relatively comparable across all grades and both schools. This is, the pattern of differences between mean MAP CA scale scores for Free/reduced lunch (yes, no) did not change at each level of Grade. All of these tests, show that the null hypothesis must be accepted. Although the null is accepted the graph below shows that the mean

scores of the students in the co-taught setting (MSA) are higher than those of the non-co-taught students at MSB.

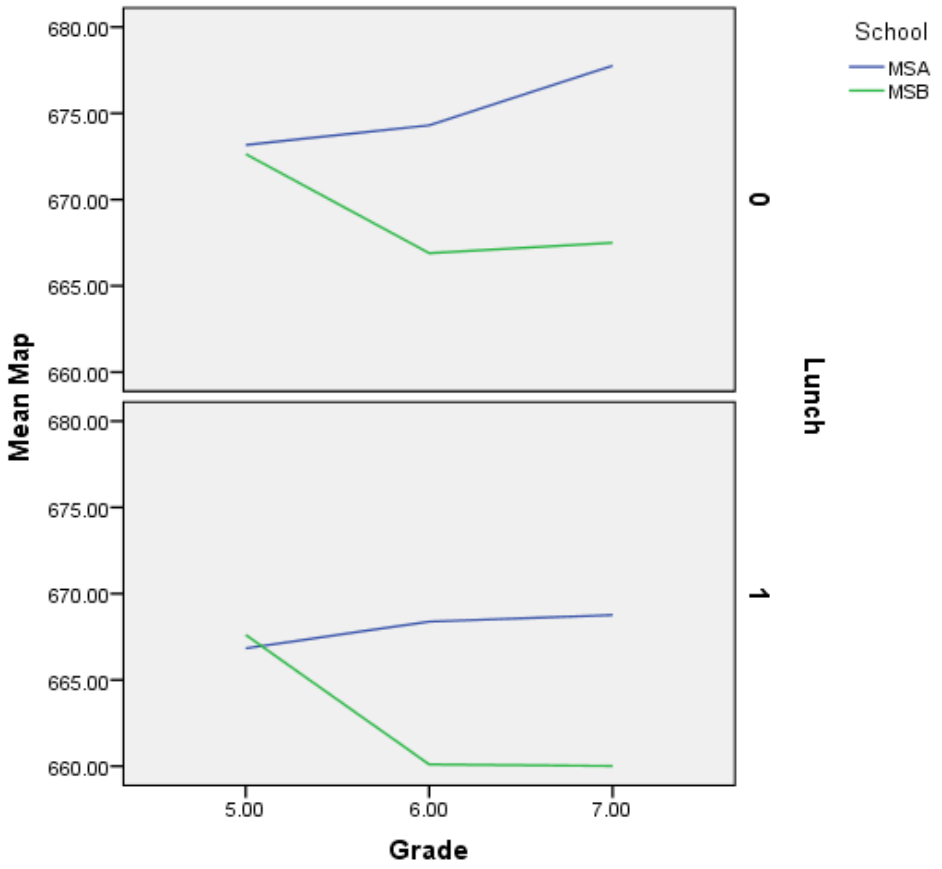

Figure 7: Interaction plot of the estimated marginal means MAP CA scale scores for Free/reduced lunch (yes = 1, no = 0) at each level of School x Grade.

However, like the special education status identification, free/reduced lunch identification does have a statistically significant effect on student standardized assessment scores as measured by the MAP CA assessment. The test for the

Free/reduced lunch effect was statistically significant ($F(1, 2259) = 15.933$, $p < 0.0001$). This indicates that the influence of IEP on the overall MAP CA scale scores was significant. As most in the education field know/believe, identification as free/reduced lunch will have a negative impact on student achievement scores. This research study supports the current body of knowledge on this subgroup, in that both schools free/reduced lunch students scored lower on the assessment than their peers at the statistically significant level.

Analysis of Question Three

The final question in the study was: Does the co-teaching model(s) of instruction make a significant difference in the achievement of minority (non-Caucasian) students' scores on the standardized MAP CA assessment in Middle School (grades 6-7) compared to a traditional model? The hypothesis states: After three years in the co-taught setting of Middle School A, minority (non-Caucasian) students' scores on the standardized MAP CA assessment grades 6 and 7 will increase at a statistically significant rate when compared to students' scores at the non-co-taught setting of Middle School B. The null hypothesis states: After three years in the co-taught setting of Middle School A, minority (non-Caucasian) students' scores on the standardized MAP CA assessment grades 6 and 7 will not increase at a statistically significant rate when compared to students' scores at the non-co-taught setting of Middle School B.

Once again the researcher began the data analysis using the three way interaction which included the grade and ethnicity. The School x Grade x Ethnicity

effect was not statistically significant ($F(6, 1499) = 0.878$, $p = 0.510$). This indicates that the influence of Ethnicity on MAP CA scale score did not depend on the level of School x Grade. This is, the pattern of differences between mean MAP CA scale scores for Ethnicity (White, Asian, Black, Hispanic, American Indian) did not change at each level of School x Grade. Next, the researcher examined the interaction between just the school and ethnicity in order to determine if the teaching method impacted the achievement scores at a statistically significant level. The School x Ethnicity effect was not statistically significant ($F(3, 744) = 0.835$, $p = 0.475$). This indicates that the influence of Ethnicity on MAP CA scale score did not depend on the type of School. This is, the pattern of differences between mean MAP CA scale scores for Ethnicity did not change at each level of School. The Grade x Ethnicity effect was not statistically significant ($F(8, 1498) = 0.495$, $p = 0.860$). This indicates that the influence of Ethnicity on MAP CA scale score did not depend on the level of Grade. This is, the pattern of differences between mean MAP CA scale scores for Ethnicity did not change at each level of Grade. All of these tests show that the hypothesis must be rejected and the null hypothesis must be accepted. Meaning that the instructional teaching method in MSA (co-teaching) did not have a statistically significant impact on the standardized achievement scores of minority population students on the MAP CA assessment when compared to the minority students in MSB (traditional method).

Because the researcher wanted to know if this study supports the common belief system that ethnicity will impact student achievement scores, the researcher ran the test with all students to determine if ethnicity impacted all student scores. The

Ethnicity effect was statistically significant ($F(4, 741) = 6.368$, $p < 0.0001$). This indicates that the influence of ethnicity on the overall MAP CA scale scores was significant. Table 24 shows the results of pairwise comparisons of mean differences of MAP CA scale score for ethnicity. The results suggest that among the 5 ethnicity, the mean differences of MAP CA scale scores between Black and White, between Black and Asian, between Asian and Hispanic, and between White and Hispanic were all statistically significant. However, when looking at the data that compare White students to all Minority students, the results are not statistically significant. The researcher believes that this is due in large part to the American Indian scores which skewed the data to the right or positively. When this subgroup is dropped from the analysis, the difference between White and Minority is statistically significant with a *p* value of 0.031. After this exclusion, these results do support the body of knowledge which says that minority students are at a disadvantage and score lower on standardized assessments.

Recommendations for Future Co-Teaching

Following the study and review of the literature, the researcher has the following suggestions and recommendations for (a) aspiring co-teaching content area partners (b) aspiring co-teaching content area and special education partners (c) building and district administrators (d) further investigation.

Recommendations for aspiring co-teaching content area partners

Two content area teachers who are aspiring to establish a co-taught regular education classroom should consider:

1. There is not a lot of research supporting quantitatively that this environment/instructional method is better for students than a traditional method. So, take the time to investigate best practices and research which supports this instructional method.
2. Talk with your administrator to get him/her on board with the idea.
3. Make sure that you clearly communicate with parents that both teachers will be giving instruction to the students daily, and both teachers will be responsible for grading and discipline.
4. Communicate with your partner about expectations, procedures/protocols, grading and discipline. The two teachers must be on the same page prior to implementation. Communicate daily about any issues you may be having in the classroom.
5. Incorporate technology in the physical environment. It will improve your daily engagement with students.
6. After establishing the co-taught classroom, work with your PLC group, department chair, and administrator to constantly evaluate and reflect on your student progress to make sure that this setting is "working" for your students.

Recommendations for aspiring co-teaching regular and special education partners

Regular and special education teachers who are aspiring to establish a co-taught regular education classroom should consider:

1. There is a lot of research supporting qualitatively and quantitatively that this environment/instructional method is better for students than a traditional method. So, take the time to investigate best practices and research which supports this instructional method.
2. Talk with your administrator to get him/her on board with the idea. Use the research and books to help with logistics like schedules and how to implement this practice in your building.
3. Make sure that you clearly communicate with parents that both teachers will be giving instruction to the students daily, and both teachers will be responsible for grading and discipline.
4. Communicate with your partner about expectations, procedures/protocols, grading and discipline. The two teachers must be on the same page prior to implementation. Communicate daily about any issues you may be having in the classroom.
5. Communicate with your partner specifically about how to divide the workload. Since the special education teacher may not be in the room the entire day, it is important to plan what is going to be taught by whom, and graded by whom.

6. Incorporate technology in the physical environment. It will improve your daily engagement with students.
7. After establishing the co-taught classroom, work with your PLC group, department chair, and administrator to constantly evaluate and reflect on your student progress to make sure that this setting is "working" for your students.

Recommendations for school and district-level administrators

Central office administrators and building administrators who have teachers with co-taught classrooms, or want co-taught classrooms should consider:

1. It is important to research the common best practice methods and collaborate with other colleagues to determine an effective evaluation tool for this method.
2. It is important to have an open mind and be receptive to faculty who would like to implement this practice in their room.
3. Talk with the financial officer to determine if there is room in the budget to allow for technology and walls which help to create the ideal co-teaching environment for faculty and students.
4. Make sure the school schedule allows time for teachers to collaborate with each other in order to ensure that student data shows goals and benchmarks are being met as well as planning for lessons.
5. Work with experts in the field to establish professional development for the building/district to integrate skills and ideas which will help to

establish/improve the co-teaching strategy and implementation. It is important that buildings are implementing best practices and research-based strategies in order to build a supportive culture in the school.

6. If a new co-teacher is being hired, it is important to include the teacher who is remaining and will be expected to work closely with the new hire.

Recommendations for further research

Further research in the subject of co-teaching between two content area teachers is being recommended by the researcher, in order to enhance the current research and develop a larger database regarding this instructional strategy. The literature review clearly shows that current research in inundated by studies which focus on co-teaching between regular and special education teachers; the studies are often qualitative in nature and those which do have quantitative data are not from valid and reliable assessments which accurately measure student academic outcomes. The researcher believes that further research is needed to determine the effectiveness of the instructional strategy on all types of students, and it's relevancy in today's classroom environments.

Regarding the aforementioned statements, the researcher is making the following recommendations for consideration:

1. Based on the limitations of the current study, a larger survey sample of students from multiple content areas, and a variety of settings (rural,

suburban, urban) should be performed to analyze if a range of similar data would be uncovered.

2. Based on the limitations of the current study and to correct biases by the researcher, it would be good to conduct research outside of the researcher's own district.
3. Based on the limitations of the current study, the researcher must be sure that the same preparations and practices are consistent within each classroom and subject area where the standard assessment is taken.
4. Using the same criteria, complete an expanded study with new groups of students to compare/contrast if student achievement outcomes on the standardized assessments are similar.
5. Using the same criteria, complete an expanded study to include teachers from other content areas which are required to take a valid and reliable standardized assessment as a way of measuring the effective classroom instructional model. Compare/contrast the results from other content areas to see if outcomes are similar or different.
6. Design a new study which would include both qualitative student and teacher measures to distinguish student and teacher beliefs about the effectiveness of this model.
7. Design a new study which would include qualitative and quantitative measures using the same subgroups for analysis to determine the student/teacher beliefs about this instructional method, and student

achievement outcomes at different grade levels (elementary and high school).

Researcher reflections

The researcher will now reflect on the process of the study and the outcomes that she hopes the reader will take away from this study. She believes that this subject is a worthwhile topic for research and that its implications for further researcher pique the reader to investigate the instructional method in new ways. Co-teaching is not a new idea, it has become very popular between regular and special education teachers, but the researcher believes that it is a valid and effective method for content area teachers as well.

From the beginning, the researcher had hoped to determine whether this was an appropriate and effective methodology of instruction for regular education students in a Midwestern suburban middle school. The researcher and her partner implement this practice with their students daily and felt that the method was beneficial for the teachers, and hoped that the study would show that it was beneficial for students as well. A new perspective and appreciation was gained for this instructional strategy, and the work that teachers and administrators put into its evaluation and effectiveness in the district. The researcher was hoping that the study would show student achievement outcomes for all subgroups were improved at a statistically significant level when utilizing the co-teaching method. Although the results were not at statistical significance, they did show improvement over the traditional model, and showed that the model did not negatively affect any of the students.

The researcher believes this study was strongly affected by the lack of experience of the teachers in the 7th grade co-teaching classroom. The first year of the study was the first year for both of the teachers to be in a two content area teacher partnership classroom. They both had previous experience co-teaching with a special education teacher, but had never shared physical space, students, or responsibilities with another content area teacher. Although these two teachers were new to the implementation of co-teaching in this way, the study shows that they were equally and even more effective at preparing their students for the yearly standardized assessment.

The researcher believes that this study demonstrates that this is a valid co-teaching practice and that it can be incorporated into more secondary level classrooms in our educational system. The benefits of having two teachers working together to provide daily instruction, differentiation, feedback, and share in the everyday requirements of being an educator are immeasurable by this one study. The researcher is grateful for the knowledge and insight gained through this practice and study, and she will continue to research and practice this instructional strategy in her own classroom.

Summary

This final chapter of the study presented the findings of the research and interpretations, recommendations, and reflections. The three research questions were examined independently and all three required that the researcher accept the null hypothesis. The recommendations gave ideas for future research to build and

improve upon the current design model and criteria in order to further the body of knowledge on co-teaching and its effects on standardized achievement scores. These suggestions for further investigation included expanding the criteria, changing locations, grade levels, and content area, and including qualitative research in the study. The reflections highlight key points to take away from the study and limitations that the researcher felt may have impeded the studies. The reflections also show that the researcher still feels that this is an effective method of instruction, and one that should be considered for adoption in more classrooms in order to help relieve the stresses put on content area teachers by sharing responsibilities with another content area teacher.

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Appendix A

Teacher Survey- Dissertation Angeline O'Neal

Age_____ Gender_____ Years teaching total_____

Years in this district _____ Years at current grade level/position_____

Years in a co-taught with special educator classroom _____

Years in a co-taught with content area educator classroom _____

Please list your degrees, date of completion, and certifications

_____

_____

_____

_____

_____

Appendix B

Administrator Survey- Dissertation Angeline O'Neal

Age_____ Gender_____ Years teaching total_____

Years in this district _____ Years at current grade level/position_____

Years in a co-taught with special educator classroom _____

Years in a co-taught with content area educator classroom _____

Years as an administrator_____

Years as an administrator in district _____

Years as an administrator in current placement _____

Years evaluating a co-taught regular & special education classroom _____

Years evaluating a co-taught two content are teachers classroom _____

Please list your degrees, date of completion, and certifications

_____

_____

_____

_____

_____

Appendix C

1. Knowledge of Subject Matter	**HAS MET**	**HAS NOT MET**
A. Demonstrates evidence of expanding knowledge of subject matter.		
B. Demonstrates appropriate responses to student questions.		
C. Demonstrates appropriate use of supplementary materials available.		
2. Instructional Skills/Competencies	**HAS MET**	**HAS NOT MET**
A. Demonstrates effective communication with students according to age and/or ability.		
B. Uses a variety of presentations.		
C. Provides appropriate assessment and feedback.		
D. Paces lessons/uses class time wisely.		
E. Demonstrates flexibility in classroom presentation.		
F. Demonstrates skill in sequencing of learning tasks.		
G. Plans and organizes instruction according to the curriculum.		
3. Classroom Management	**HAS MET**	**HAS NOT MET**
A. Maintains discipline in a constructive and consistent manner.		
B. Maintains a pleasant and open environment.		
C. Keeps adequate and accurate records and submits them in a timely manner.		
D. Participates in referral and/or staff process and implements recommendations.		
E. Knows students as individuals.		
4. Professionalism	**HAS MET**	**HAS NOT MET**
A. Complies with Board and building policies.		
B. Takes steps to counteract prejudices based on race, religion, gender, age, or personal attributes.		
C. Provides and accepts constructive criticism.		
D. Maintains a cooperative working relationship with parents and co-workers.		
E. Maintains professional relationships with students.		
F. Responds to administrative requests in a timely manner.		

ADMINISTRATOR COMMENTS:

Teacher's Signature _____ **Date**_____

Administrator's Signature _____ **Date**_____

Teacher's Written Comments _____ **are** _____ **are not attached.**

TEACHER COMMENTS:

Teacher's Signature _____ **Date**_____

Administrator's Signature _____ **Date**_____

Teacher's Written Comments _____ **are** _____ **are not attached.**

Appendix D

Teacher Observation _____ Date _____

Time _____ Beginning- Middle- End of period

Co-Taught with special educator – yes/no Co-Taught with content teacher- yes/no

Learning Objective Posted- yes/no Agenda posted- yes/no

Level of Student Engagement- _____%

Explanation of engagement

_____

_____

Marzano Strategy Incorporated

1. Identify Similarities/Differences- yes/no- Ex._____
2. Summarize/Note Taking- yes/no- Ex._____
3. Praise Effort/Recognition- yes/no- Ex._____
4. Non-Linguistic Representation- yes/no- Ex. _____
5. Homework/Applied Practice- yes/no- Ex. _____
6. Cooperative Learning- yes/no- Ex. _____
7. Setting Objectives/Give Feedback- yes/no- Ex. _____
8. Generate/Test Hypothesis- yes/no- Ex. _____
9. Question/Cue/Advanced Organizer- yes/no- Ex. _____

Level of Teacher Engagement- _____%

Explanation of engagement

_____

_____

Appendix E

Division of Education Leadership & Policy Studies

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Informed Consent for Participation in Research Activities

The Effects of Co-Teaching on Regular Education and Special Education Students' Standardized Communication Arts Test Scores in a Suburban Midwest Middle School

Participant _____ HSC Approval Number _____

Principal Investigator_Angeline O'Neal_____PI's Phone Number 314-604-8253

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1. You are invited to participate in a research study conducted by Angeline O'Neal and Dr. Kathleen Sullivan-Brown. The purpose of this research is to add to the body of knowledge about co-teaching which would influence administrator and teacher perceptions about the effects of co-teaching for both regular and special education students and teachers. The study aims to show that co-teaching (specifically with two content area teachers) will have a positive impact on student achievement scores. This may aid educators in how they structure their instruction to prepare students for high-stakes assessments.

2. a) Your participation will involve

*If you are an administrator you will:

1. Complete the administrator demographic survey.
2. Share evaluations, observations, professional development, and walk through information for the Communication Arts teachers in the study for the time period of 2010-2012. You will not share who the teacher is and will white out both the teacher and evaluating administrator name. However, you will need to identify the Communication Arts or Special Education placement of the teacher.
3. This can be completed in hard copy and sent to the researcher, anonymously via the district's mailing system. The survey completion should

take no longer than 10 minutes, and compilation of teacher information should take no more than one week.

*If you are a teacher you will:

1. Complete the teacher demographic survey.
2. This can be completed on hard copy and should take no longer than 10 minutes to complete, this is to be sent to the researcher anonymously through the district's mailing system.
3. If you consent to participate, the researcher will be analyzing several years of MAP test scores from your students. You will not need to do anything additional but you need to be aware that the data from this time period for your students will be analyzed.
4. If you consent to participate, your administrator will share information about you (anonymously) with the researcher. The information to be disclosed are your DESE evaluations (performed twice/year by the evaluating administrator), observations, and walkthrough data from this time period. The administrators will not disclose the teachers' names when sharing the evaluation/observation/walkthrough data, but will identify teachers by grade level and a unique identifier (i.e. 6^{th} grade teacher a, b, c). Teachers have access to the information that will be shared because they are given copies of their evaluations, and feedback from the observations/walkthroughs.

Approximately 22 teachers (content area & special education), and 6 administrators may be involved in this research from two middle schools in the same school district.

b) The amount of time involved in your participation will be approximately 10 minutes to complete the survey and no longer than one week to compile teacher feedback from 2010-2012.

3. There are no known risks associated with the study. Teachers whose evaluations/walkthroughs/observations do not face job sanctions based on the information released in this study. Teachers in the district are not judged as competent based solely on the results of their students' achievement, so this study should not affect their position with the district. There is a risk of loss of confidentiality because all teachers and administrators are from just two middle schools in the district, and employee names and positions are listed on the schools' websites.

4. There are no direct benefits for you participating in this study. However, your participation will contribute to the knowledge about the effects of co-teaching with two content area teachers on student achievement as measured by the standardized MAP CA assessment and may help society.

5. Your participation is voluntary and you may choose not to participate in this research study or to withdraw your consent at any time. You may choose not to answer any questions that you do not want to answer. You will NOT be penalized in any way should you choose not to participate or to withdraw. You may withdraw by contacting either the researcher (Angeline O'Neal) or chair-person (Kathleen Sullivan-Brown) via telephone or e-mail.

6. By agreeing to participate, you understand and agree that your data may be shared with other researchers and educators in the form of presentations and/or publications. In all cases, your identity will not be revealed. In rare instances, a researcher's study must undergo an audit or program evaluation by an oversight agency (such as the Office for Human Research Protection). That agency would be required to maintain the confidentiality of your data. In addition, all data will be stored on a password-protected computer and/or in a locked office.

7. If you have any questions or concerns regarding this study, or if any problems arise, you may call the Investigator, Angeline O'Neal (314) 604-8253or the Faculty Advisor, Dr. Kathleen Sullivan-Brown (314) 516-5944. You may also ask questions or state concerns regarding your rights as a research participant to the Office of Research Administration, at 516-5897.

I have read this consent form and have been given the opportunity to ask questions. I will also be given a copy of this consent form for my records. I consent to my participation in the research described above.

Participant's Signature	Date	Participant's Printed Name
		Angeline O'Neal
Signature of Investigator or Designee	Date	Investigator/Designee Printed Name